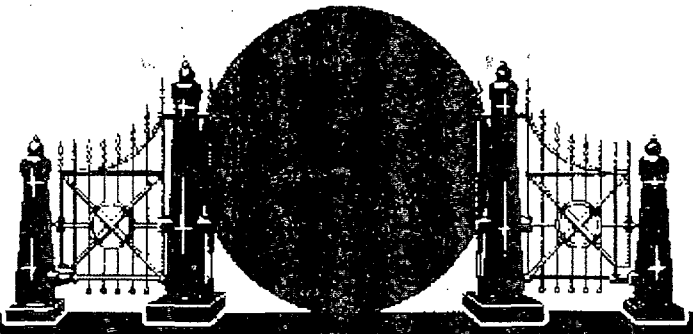

Picatinny Installation Restoration Program™

Picatinny is an Official Hawk Watch Site

RECORD OF DECISION

SITE 23 -
THE POST FARM LANDFILL

PICATINNY
NEW JERSEY

FINAL

AUGUST 2004

DEPARTMENT OF ARMY
INSTALLATION MANAGEMENT AGENCY
NORTHEAST REGION OFFICE
PICATINNY, NEW JERSEY 07806-5000

September 04, 2004

Environmental Affairs Division

SUBJECT: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/Interagency Agreement (IAG) Administrative Docket No. II-CERCLA-FFA-001-04 Section 10 Record of Decision and Plans for Remedial Action: Submittal for the EPA signature for the **Site 23 Record of Decision:** Review is ER-A eligible

Mr. William Roach
U.S. Environmental Protection Agency
Region 2
290 Broadway, 18th Floor
New York, NY 10007-1866

Mr. Gregory Zalaskus
New Jersey Department of Environmental Protection
Division of Responsible Party Site Remediation
Bureau of Case Management
401 East State Street, Floor 5, P.O. Box 028
Trenton, New Jersey 08625-0028

Dear Gentlemen:

Enclosed are copies of the **Post Farm Record of Decision**. The Garrison Commander of Picatinny, LTC Seitz, has signed as the document as it is within his approval authority per Army guidance as the cost for the final action is less than 2M.

We have fully complied with all EPA comments contained in the letter dated August 9th. I have emailed a response-to-comments to allow you to ensure their inclusion. Again we did not receive any comments from the NJDEP.

I ask that Mr. Zalaskus immediately start the process to send a concurrence letter accepting the ROD. This letter is apparently is required for EPA Region II Director of Emergency and Remedial Response Division, Mr. Pavlou, to sign. **I believe we can get this signed by EPA before the end of the fiscal year.**

Call me if you have any questions.

Sincerely,

TED GABEL,
Project Manager for
Environmental Restoration

Enclosure

Copies Furnished:

U.S. Army Environmental Center, Mr. Rich Isaac
Subsurface Solutions, Barbara Dolce
Shaw Environmental Inc., Mr. Doug Schicho
RAB CoChair, Mr. Michael Glaab
U.S. Army Corps of Engineers, Ms. Nancy Flaherty
USFWS, Mr. Clifford Day

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L ..... micrograms per liter
1,2-DCE 1,2-dichloroethene
2,3,7,8-TCDD 2,3,7,8-tetrachlorodibenzo-p-dioxin
AR ..... Army Regulation
ARAR ..... applicable or relevant and appropriate requirement
ARDEC ..... Army Research Development and Engineering Center
bgs ..... below ground surface
BNA ..... base neutral/acid extractable
CEA ..... Classification Exception Area
CERCLA ..... *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CERCLIS ..... Comprehensive Environmental Response, Compensation and Liability Information System
cis-1,2-DCE cis-1,2-dichloroethene
cm/sec ..... centimeters per second
COC ..... contaminant of concern
COPC ..... contaminant of potential concern
cy ..... cubic yard
DBA ..... Drum Burial Area
DCSCC ..... Direct Contact Soil Cleanup Criteria
EAO ..... Environmental Affairs Office
ER, A ..... Environmental Restoration, Army
FS ..... Feasibility Study
ft msl ..... feet above mean sea level
ft ..... feet
ft/day ..... feet per day
ft/yr ..... feet per year
ft^2 ..... square feet
GIS ..... Geographic Information System
GPB ..... Green Pond Brook
HHRA ..... human health risk assessment
HI ..... hazard index
ICFKE ..... ICF Kaiser Engineers, Inc.
IRP ..... Installation Restoration Program
IT ..... IT Corporation
LOC ..... level of concern
LUC ..... land use control
MCL ..... Maximum Contaminant Level
mg/kg ..... milligrams per kilogram
NBA ..... Northern Burial Area
NCP ..... National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP ..... New Jersey Department of Environmental Protection
NPL ..... National Priorities List
NRDCSCC ..... Non-Residential Direct Contact Soil Cleanup Criteria
O&M ..... operation and maintenance
OCDD ..... octachlorodibenzodioxin
OMEE ..... Ontario Ministry of the Environment and Energy
PAERAB ..... Picatinny Environmental Restoration Advisory Board
PCB ..... polychlorinated biphenyl
PICA ..... Picatinny
pCi/L ..... picocuries per liter
RCRA ..... Resource Conservation and Recovery Act
RD ..... Remedial Design
RI ..... Remedial Investigation

RI/FS ..... Remedial Investigation/Feasibility Study
ROD ..... Record of Decision
SARA ..... Superfund Amendments and Reauthorization Act
SI ..... Site Investigation
SVOC ..... semivolatile organic compound
TAL ..... target analyte list
TBC ..... to be considered
TCL ..... target compound list
TCLP ..... toxicity characteristic leaching procedure
TRC ..... Technical Review Committee
USACE ..... U.S. Army Corps of Engineers
USAEHA ..... U.S. Army Environmental Hygiene Agency
USEPA ..... U.S. Environmental Protection Agency
USGS ..... U.S. Geological Survey
UXO ..... Unexploded Ordnance
VOC ..... volatile organic compound
WWI ..... World War I
WWII ..... World War II

SECTION 1.0

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Facility Name and Location: Picatinny, United States Army Installation Management Agency, Northeast Regional Garrison Office Building 319, Picatinny, New Jersey 07806-5000. The facility is located as follows:

- Morris County
- Congressional District 11
- EPA Region 2
- CERCLIS – EPA ID# NJ3210020704

This Record of Decision (ROD) specifically addresses all environmental media (soil, groundwater, surface water, and sediment) at Site 23 (PICA 065), Post Farm Landfill at Picatinny, Rockaway Township, New Jersey (**Figure 1**). Site 23 occupies approximately 10.3 acres and is located near the southern corner of Picatinny along the top of a ridge that forms the eastern boundary of Picatinny. Site 23 consists of a cleared borrow pit area and two remediated areas with soil covers. The recently remediated areas are called the Drum Burial Area (DBA) located in the southern end of the site and the Northern Burial Area (NBA) located on the northwest end of the site. The land between the two remediated areas is called the Central Borrow Pit. The Central Borrow Pit is open, and currently contains a linear mound of brush, debris, and fill dirt. **Figure 2** illustrates the location of Site 23 within Picatinny.

1.2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the selected remedy for Site 23 located at Picatinny in Rockaway Township, New Jersey. The remedial action is selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the greatest extent possible, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The information supporting the decisions on the selected remedial action is contained in the administrative record, which is available at the Installation Restoration Program Office located at Building 319 at Picatinny. These decisions have been made by the Army and the USEPA. Comments received from the New Jersey Department of Environmental Protection (NJDEP) were evaluated and considered in selecting the final remedy.

The NJDEP concurs with the selected remedy. The U.S. Environmental Protection Agency (USEPA) has approved the feasibility study (FS) and proposed plan for the site.

1.3 ASSESSMENT OF THE SITE

The current and realistic future land use at Site 23 is industrial (as a training site for the U.S. Army). Future development of the 10.3 acres of land defined as Site 23 will be consistent with the remedy and acceptable exposure scenarios presented in this ROD. The response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances from this site, which may present an imminent and substantial endangerment to public health or welfare. Based on the site-specific risk assessment, risk to industrial receptors is within the USEPA range where site-specific decisions can be made. It should be noted that there is a potential for risk to residential receptors, should the site be used in that capacity. The potential for risk to residential receptors has never been quantified in a risk assessment. NJDEP Direct Contact Soil Cleanup Criteria (DCSCC) were utilized as information to be considered (TBC) for Site 23. Exceedances of both residential and non-residential DCSCC were a factor in remedy selection for this site. Investigations at this site have determined that low levels of hazardous substances are present in groundwater at concentrations that exceed the chemical-specific applicable or relevant and appropriate requirements (ARARs). Contaminants present in groundwater may also be transported to surface water bodies through the discharge of groundwater to an off-post stream located hydraulically downgradient of Site 23. Fly ash buried in the landfilled areas of Site 23 is also present. The remedy for Site 23 is not ecologically driven because Site 23 represents a small disturbed area within a larger area otherwise

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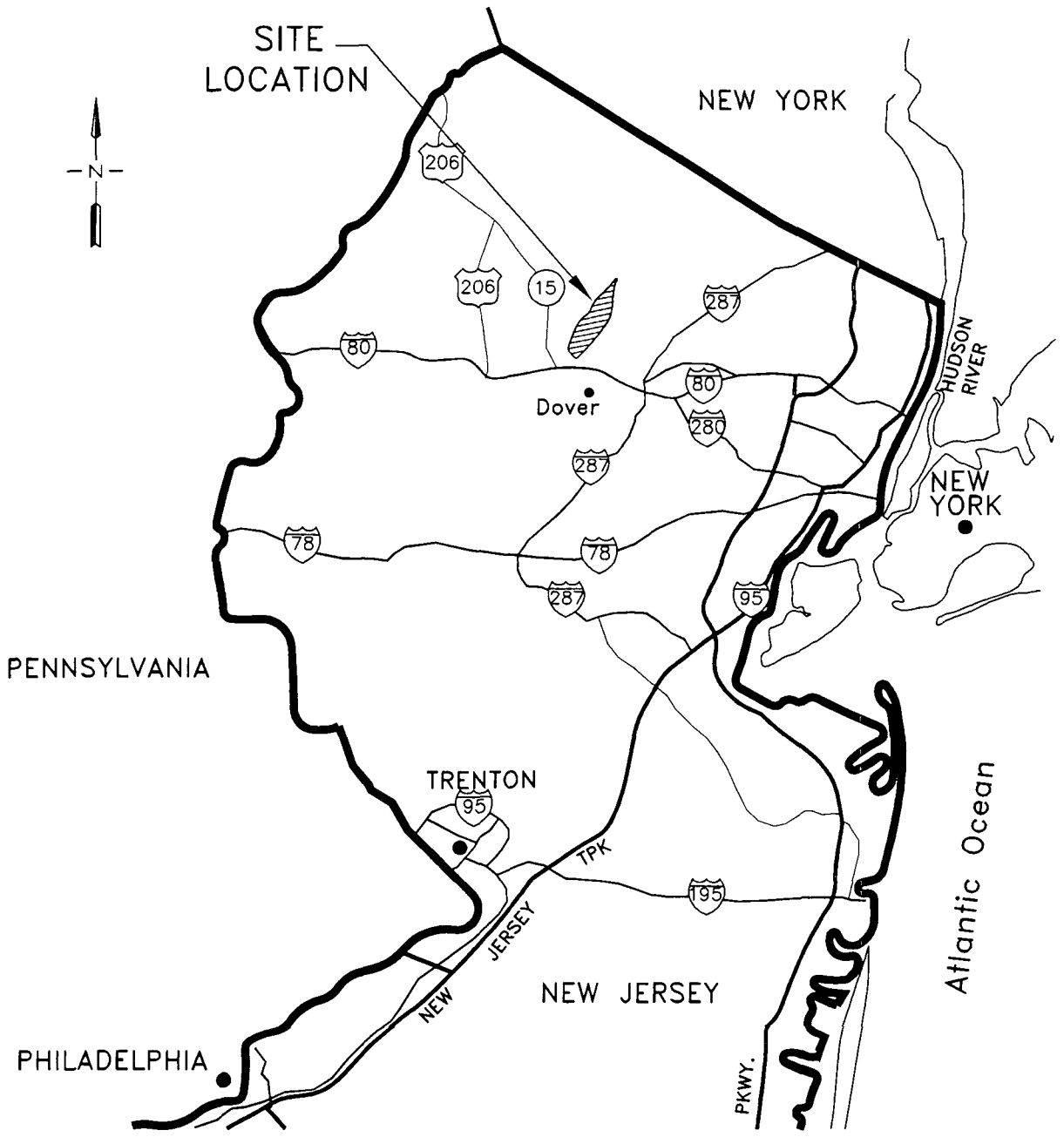

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Picatinny Installation Restoration Program

U.S. Army Corps of Engineers

Shaw Environmental, Inc.

FIGURE 1

PICATINNY SITE LOCATION MAP

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PICATINNY, DOVER, NEW JERSEY

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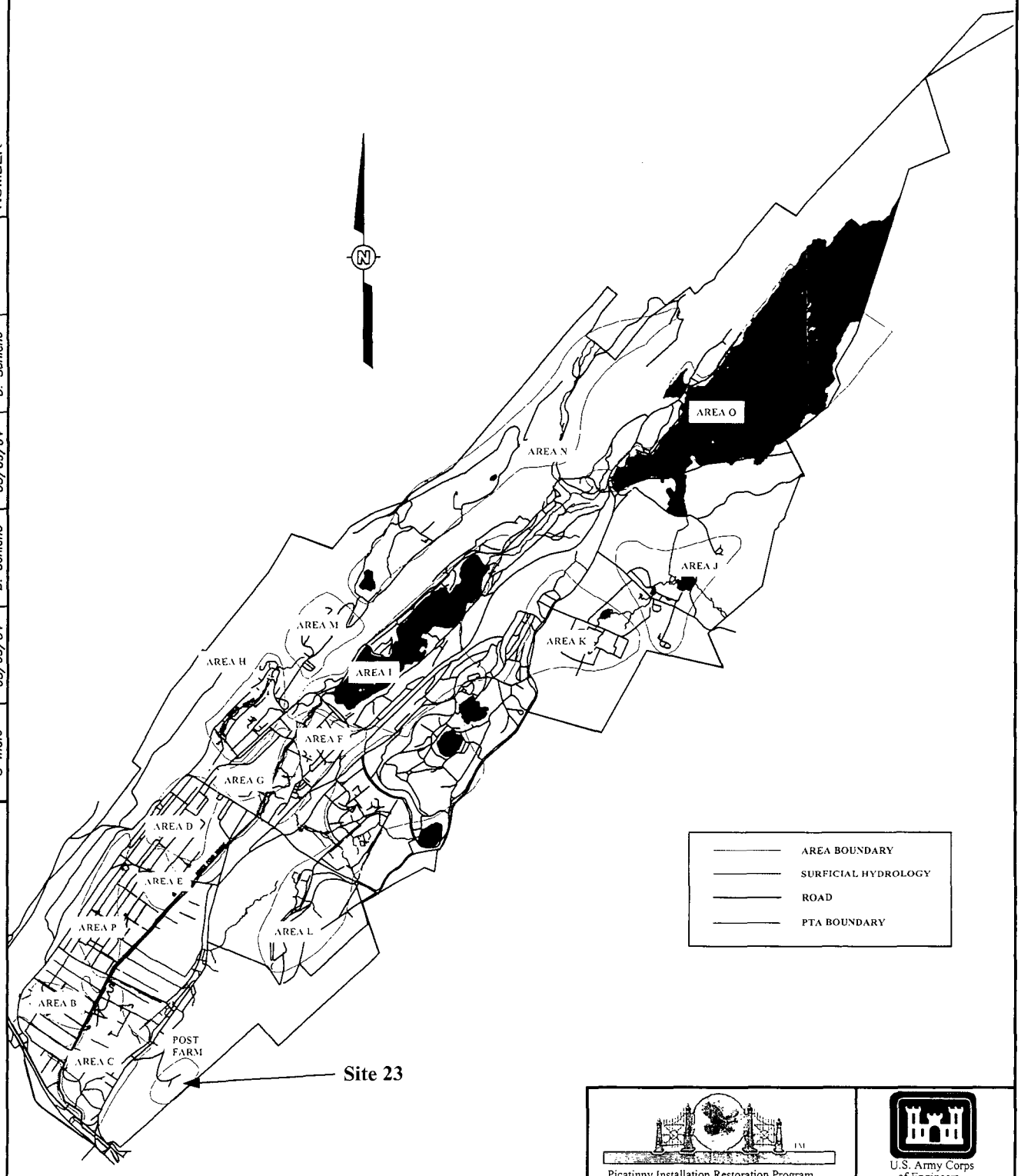

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Picatinny Installation Restoration Program

U.S. Army Corps of Engineers

Shaw Shaw Environmental, Inc.

FIGURE NO. 2

SITE LOCATION IN PICATINNY

866717-519-02000

PICATINNY, DOVER, NEW JERSEY

characterized as having suitable habitat for ecological receptors. In addition, the existing soil cover at Site 23 will prevent most future exposures and reduce migration potential.

1.4 DESCRIPTION OF THE SELECTED REMEDY: GROUNDWATER MONITORING AND IMPLEMENTATION OF LAND USE CONTROLS

During 1993, a removal action was conducted at Site 23 to remove buried drums, debris, and other buried containers. Therefore, no principal threat wastes are currently present at the site.

The remedial action at Site 23 is part of a comprehensive environmental investigation and remediation process currently being performed at Picatinny. The Army designated over 150 site numbers to the buildings and surrounding land that supported former production operations. To ensure the investigation and cleanup of the sites was performed in an organized manner and that the sites with the greatest potential for environmental contamination were addressed first, the Army categorized all of the sites into 16 Areas named A through P. Site 23 was designated as being located within Area C. The Army anticipated that Area A had the greatest chance for environmental contamination and Area P the least. The Army further categorized the areas into three phases. The first phase of investigation included Areas A though G, the second phase H through K, and the third and last phase L through P. A site layout map for Picatinny, which displays each area, is presented as **Figure 2**. This ROD addresses all environmental media at Site 23. Area C, which includes Site 23, is one of 16 Areas being addressed by the Army's Installation Restoration Program (IRP) at Picatinny. The remaining areas in Picatinny are being considered separately and remedies for these areas are presented in separate documents. This document represents the fifth ROD being submitted by the Army for Picatinny. The Army anticipates it will submit many other RODs for Picatinny over the next several years.

The selected remedy for Site 23 consists of:

- Long-term groundwater monitoring using the existing groundwater monitoring wells;
- Long-term monitoring of surface water and sediment from the off-post spring and seep;
- Implementation of land use controls (LUCs); and,
- Collection of one round of surface soil samples from locations that have previously exhibited exceedances of the Levels of Concern (LOCs) to ensure isolated areas of contamination are not more widespread. If unexpected levels of contamination are found in the surface soil samples additional topsoil may be placed at the site.

The U.S. Army will be responsible for maintaining the effectiveness of LUCs. The specifics of LUCs and the specifics of implementing, reporting on and enforcing LUCs will be described in the Remedial Design (RD).

The actions described in this ROD are intended to eliminate the potential for human contact with fly ash buried at Site 23 and with contaminants detected in groundwater. Promulgated Federal criteria are being used as performance standards for groundwater under this remedial action.

1.5 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, and is cost-effective. The selected remedy complies with ARARs. There are chemical-specific ARARs for groundwater and surface water at Site 23. No chemical-specific ARARs exist for soils or sediments. There have been no chemical-specific ARAR exceedances in Site 23 surface water. Although a small number of contaminants in groundwater at Site 23 exceed standards, the remedy complies with chemical-specific groundwater ARARs by ensuring no human exposure to groundwater contamination until such time as groundwater criteria are met through attenuation of groundwater contaminants. The selected remedy attains the mandates of CERCLA § 121, and, to the extent practicable, the NCP. In addition, the selected remedy does not contain treatment as a principal element because no source materials constituting principal threats are present at Site 23. Because this remedy will result in hazardous substances, pollutants or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure for a period of time, statutory reviews will be conducted every five years after initiation of

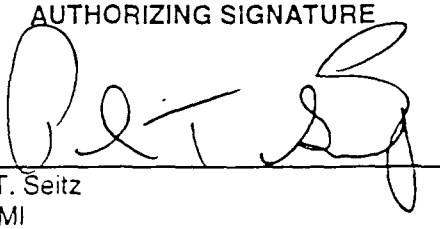
remedial action to ensure that the remedy is, or will be, protective of human health and the environment until such time as it may be determined that the site qualifies for unrestricted use.

1.6 ROD DATA CERTIFICATION CHECK LIST

The following information is included in the Decision Summary (**Section 2.0**) of this ROD. Additional information can be found in the Administrative Record for this site.

Criterion	Section	Page Number
Chemicals of Concern and Their Respective Concentrations	2.7.1.1	2-19
Baseline Risk Represented by the Chemicals of Concern	2.7	2-17
Cleanup Levels Established for Chemicals of Concern and the Basis for These Levels	2.7.1.1	2-19
How Source Materials Constituting Principal Threats will be Addressed	1.5	1-4
Current and Reasonably Anticipated Future Land Use Assumptions Used in Baseline Risk Assessment and ROD	2.6	2-17
Potential Land and Groundwater Use Available as a Result of the Selected Remedy	2.6	2-17
Estimated Capital, Annual Operation and Maintenance (O&M) and Total Present Worth Costs, Discount Rate, and the Number of Years Over Which the Remedy Cost Estimates are Projected	2.11.3	2-34
Key Factors Leading to Selection of Selected Remedy	2.11	2-32

1.7 AUTHORIZING SIGNATURE



Paul T. Seitz
LTC, MI
Garrison Commander

03 Sep 04
Date

George Pavlou, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency, Region 2

12-20-04
Date

SECTION 2.0

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

This ROD describes the selected action to reduce human health risks associated with contaminants detected in groundwater at Picatinny Site 23 in Rockaway Township, New Jersey. The selected action also includes measures to prevent human exposure to fly ash buried at Site 23. Picatinny is a National Priorities List (NPL) site and is registered under the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) number NJ3210020704. The Army is the lead agency for this action. The funding for this action will be provided from the Environmental Restoration, Army (ER, A) account.

Picatinny is located approximately four miles north of the City of Dover in Rockaway Township, Morris County, New Jersey. The location of Picatinny is presented on **Figure 1**. Some of the nearby populous areas are Morristown, Morris Plains, Parsippany, Troy Hills, Randolph Township, and Sparta Township. The Picatinny land area consists of 6,491 acres of improved and unimproved land. Picatinny is situated in an elongated classic U-shaped glacial valley, trending northeast-southwest between Green Pond Mountain and Copperas Mountain on the northwest and an unnamed hill on the southeast. Most of the buildings and other facilities at Picatinny are located on the narrow valley floor or on the slopes along the southeast side.

Site 23 occupies approximately 10.3 acres and is located at an approximate elevation of 840 – 900 feet above mean sea level (ft msl) near the southern corner of Picatinny along the top of a ridge that forms the eastern boundary of Picatinny. Several residences, and warehouse buildings, are located approximately 1,000 feet (ft) south of the site outside the Picatinny boundary. The Post Farm Landfill is serviced by a paved access road (Old Post Road). The entire site is located outside the 500-year flood plain of Green Pond Brook (GPB). A general map for Site 23 is presented on **Figure 3**.

The site is situated between two hills along the ridge, and surface runoff flows to both sides of the ridge. Surface runoff is to the north and west along Old Post Road and also to the southeast towards several residences located near Richard Mine Road. Groundwater is encountered at the site at depths ranging from approximately 1 – 40 ft below ground surface (bgs), and flows from north to south across the site. Numerous seeps have been identified hydraulically downgradient of the site along a portion of the unnamed stream in an area that extends approximately 100 ft upstream from the northeastern edge of the Mountain View Manor parking lot.

Site 23 consists of the former Drum Burial Area (DBA) located in the southern end of the site, the Northern Burial Area (NBA), and the Central Borrow Pit, a cleared flat area located in the middle of the site. Both the DBA and the NBA were landfilled areas and are currently enclosed by perimeter fencing. The Central Borrow Pit is open, and currently contains a linear mound of brush, debris, and fill dirt.

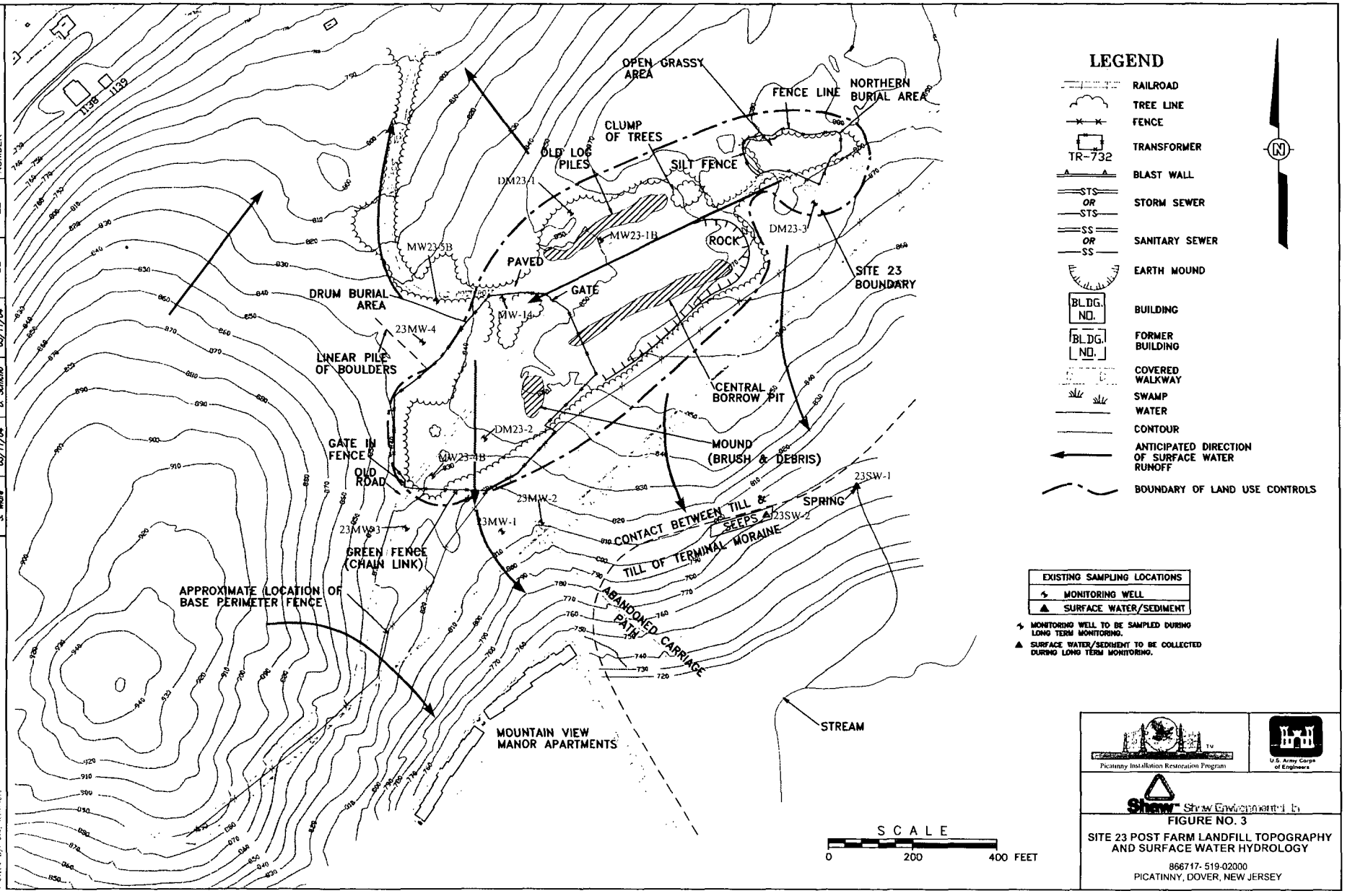
The remedial alternative that is presented in this ROD was selected by the Army and USEPA Region 2. Comments received from the NJDEP were evaluated and considered in selecting the final remedy. The remedial action is funded by the U.S. Department of the Army and was selected in accordance with CERCLA as amended by the SARA, the NCP, and Army Regulation (AR) 200-1, Environmental Protection and Enhancement, as applicable.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Picatinny Background

Picatinny is owned and operated by the U.S. Army. The base was a major source of munitions for World War I (WWI), World War II (WWII), the Korean War, and the Vietnam Conflict. During those periods, Picatinny was involved in the production of explosives, rocket and munition propellants, pyrotechnic signals and flares, fuzes, and metal components. Currently, the primary mission of Picatinny is research, development, and engineering of munitions and weapons.

Over the years, environmental investigations into the operations and waste management procedures for Picatinny have indicated the potential for contamination. The facility was included on the NPL in March of 1990.


OPEN GRASSY AREA
FENCE LINE
NORTHERN BURIAL AREA
CLUMP OF TREES
OLD LOG PILES
SILT FENCE
DM23-1
MW23-1B
ROCK
DM23-3
MW23-5B
PAVED
SITE 23 BOUNDARY
DRUM BURIAL AREA
GATE
MW-14
23MW-4
LINEAR PILE OF BOULDERS
CENTRAL BORROW PIT
DM23-2
GATE IN FENCE
OLD ROAD
MW23-4B
MOUND (BRUSH & DEBRIS)
23SW-1
23MW-2
23MW-1
23SW-2
SPRING
SEEPS AT CONTACT BETWEEN TILL & TILL OF TERMINAL MORAINE
23MW-3
GREEN FENCE (CHAIN LINK)
APPROXIMATE LOCATION OF BASE PERIMETER FENCE
ABANDONED CARRIAGE PATH
STREAM
MOUNTAIN VIEW MANOR APARTMENTS
1139
1139
LEGEND
RAILROAD
TREE LINE
FENCE
TRANSFORMER
TR-732
BLAST WALL
STS OR STS
STORM SEWER
SS OR SS
SANITARY SEWER
EARTH MOUND
BLDG. NO.
BUILDING
BLDG. NO.
FORMER BUILDING
COVERED WALKWAY
SWAMP
WATER
CONTOUR
ANTICIPATED DIRECTION OF SURFACE WATER RUNOFF
BOUNDARY OF LAND USE CONTROLS
N
EXISTING SAMPLING LOCATIONS
MONITORING WELL
SURFACE WATER/SEDIMENT
MONITORING WELL TO BE SAMPLED DURING LONG TERM MONITORING.
SURFACE WATER/SEDIMENT TO BE COLLECTED DURING LONG TERM MONITORING.
SCALE
0
200
400 FEET
DRAWN BY
S. Wade
03/11/04
CHECKED BY
D. Schiele
03/11/04
APPROVED BY
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DRAWING NUMBER
23PF031104.dwg
Picatinny Installation Restoration Program
U.S. Army Corps of Engineers
Shaw Environmental, Inc.
FIGURE NO. 3
SITE 23 POST FARM LANDFILL TOPOGRAPHY AND SURFACE WATER HYDROLOGY
866717- 519-02000
PICATINNY, DOVER, NEW JERSEY

2.2.2 Site 23 Background

Historical information on the use of Site 23 is limited. Most of the historical information pertaining to the site was obtained from a records search and personnel interviews conducted in 1991 by Weston, as part of the Preliminary Assessment for Site 23.

Prior to 1940, Site 23 was a farm. From the 1940s to the 1970s, the DBA received industrial wastes generated at Picatinny. These drummed wastes included caustic paint stripper, used hydraulic oils, wastewater from oil reservoirs, tank cleaning wastes, fly ash, and solid waste. All buildings at the site had been demolished by 1951. In the 1950s, Site 23 was used mostly for borrow pit materials. Drums of paint remover were reportedly disposed of in trenches in the DBA. In the 1960s, a pit in the southern portion of the site received fly ash from coal burning operations, paint stripping wastes, phenols, and explosive-laden hydraulic oils either in containers or as free liquid. This pit was then covered with soil obtained from the Central Borrow Pit area. The site has been recently used to dispose of clean fill and vegetative matter along the western side of the central borrow area but is currently used for recreational activities, primarily hunting.

Ten investigations have been conducted previously at Site 23: (1) U.S. Army Environmental Hygiene Agency (USAEHA) Groundwater Sampling, 1981-1983; (2) Dames and Moore Site Investigation (SI), 1988; (3) U.S. Geological Survey (USGS) Geophysical Survey, 1990; (4) Chemical Waste Management Soil Sampling Program, 1990; (5) Weston Preliminary Assessment (PA), 1991-1992; (6) Weston SI, 1992; (7) Weston Preliminary Subsurface Investigation, 1993-1994; (8) Dames and Moore Phase I Remedial Investigation (RI), 1994; (9) ICF Kaiser Engineers, Inc. (ICFKE) Additional RI, 1996; and (10) ICFKE Fracture Trace Analysis, 1998. The earliest monitoring well was installed at Site 23 during the USAEHA Groundwater Sampling event in 1981. Ten additional monitoring wells were installed at Site 23 during 1981 – 1996.

The two most recent investigations, the Phase I RI conducted in 1994 and the Additional RI conducted during 1996, have identified the presence of various contaminants including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), radiological parameters, and dioxins/furans. The majority of soil contamination has been detected at low concentrations, scattered throughout the site.

An investigation performed by USGS in 1990 identified numerous partially buried and potentially buried drums at the site. In response to a Notice of Violation of the New Jersey Spill Compensation and Control Act and the Water Pollution Act related to the discovery of contaminants at the DBA, Picatinny secured the site with fencing and initiated a contract for a drum removal/site investigation. During the investigation/cleanup in 1993, wastes were excavated and removed from both the NBA and the DBA. The following materials were removed from the site and disposed of properly:

- Eight drums of oil;
- Eight drums of tar;
- Eight drums of industrial batteries;
- Seven drums of water;
- Seven drums of polystyrene pails;
- Three drums filled with small containers;
- 38 cubic yards (cy) of contaminated soil;
- 349 empty 55-gallon drums; and,
- 30 cy of scrap steel.

During the removal, the contractor constructed staging areas for drums, contaminated soil, and a decontamination pad for the excavation equipment. All of the drum staging and soil areas were leveled and approximately 165 cy of certified clean soil from an off-site source was placed on these areas to

provide a cover thickness of 6 – 8 inches. The entire excavated area was then covered with 6 – 18 inches of soil obtained from a wooded hillside located in the northeast portion of the Post Farm Landfill. The areas were seeded and fertilized in order to establish vegetative growth (Weston, 1993). This soil cover is currently intact and covered with grass, scrub shrubs and small trees. None of the vegetation on the site is routinely cut and it is reverting to a wild state. A small dirt road over the southern burial area cover has resulted in some minor erosion, however, no fly ash is visible at the ground surface. Other than on this dirt road there are no appreciable signs of erosion of the southern burial area or the NBA soil covers.

Additional information regarding these topics can be found in the Final Removal Action Report, Post Farm Landfill – DBA, Picatinny (Weston, 1993); the Picatinny Site 23 – Post Farm Landfill Additional Investigation Data Report (ICFKE, 1997); and the Picatinny Phase I RI Report (Dames and Moore, 1998).

TIMELINE

The Site 23 RI/FS process has involved multiple steps that are summarized in several documents. The process has taken a number of years to perform. All of the major project milestones are listed below:

1981-1983 – The first groundwater samples were collected from Site 23. USAEHA/ICM installed one groundwater-monitoring well and analyzed groundwater samples for water quality parameters. There were no detections of organic or inorganic constituents.

1988 – A formal site investigation was performed by Dames and Moore on behalf of the Army. Dames and Moore installed three groundwater-monitoring wells and collected samples of soil and groundwater.

1990 – The USGS performed a geophysical survey over the entire site. This survey delineated all burial areas at the site.

1990 – Chemical Waste Management collected samples of surface soil on behalf of the Army.

1991 – Weston performed a Preliminary Assessment (PA) on behalf of the Army. The PA included document review, historic records search and personnel interviews.

1991/1992 – Weston performed a three-phase removal action. The action involved the removal of all buried containers (i.e. drums and cans) from the Post Farm Landfill collection of numerous soil samples and covering the former burial areas with clean soil from on-site.

June 1993 – The Army released the Final "Removal Action Report Post Farm Landfill-Drum Burial Area Picatinny Rockaway Township, New Jersey". This report documented all removal action and sampling activities performed at the Post Farm.

1994 – Dames and Moore performed a remedial investigation at the Post Farm Landfill. The RI involved hydrogeologic investigation, groundwater, and surface soil sampling.

1996 - ICF Kaiser performed an additional RI investigation. This investigation involved fracture trace analysis, hydrogeologic investigation, groundwater sampling, subsurface soil sampling, surface water sampling and sediment sampling.

December 1997 – The Army released the draft final revision 1 (document approved as final) "Site 23 Post Farm Landfill Additional Investigation Data Report Volumes I & II". This document contained all of the results of the 1996 additional remedial investigation.

July 1998 – The Army released the draft final (document approved as final) "Phase I Remedial Investigation Report, Volume 2 Study Area C." This document presented all of the Dames and Moore RI results.

June 2001 – The Army released the final "Feasibility Study for Site 23 Picatinny, New Jersey". This document presents the decision process for the remedy selection that is documented in this ROD.

December 2003 – The Army released the final "Proposed Plan for Site 23, Post Farm Landfill Picatinny, New Jersey". This document presented the preferred remedial alternative for Public Comment

2.2.3 Enforcement Activities

In response to a Notice of Violation of the New Jersey Spill Compensation and Control Act and the Water Pollution Act related to the discovery of contaminants at the DBA, Picatinny conducted an investigation/cleanup in 1993. During this non-time-critical removal action, buried drums, containers, and other waste materials were excavated and removed from both the NBA and the DBA. Following waste removal, the area was backfilled with clean soil and seeded and fertilized to establish vegetative growth (Weston, 1993).

No other formalized enforcement activities have occurred at Site 23. Picatinny is working in cooperation with USEPA and NJDEP to apply appropriate remedies that will preclude the necessity of formalized enforcement actions, such as Notices of Violation.

2.3 COMMUNITY PARTICIPATION

The Army has involved the public in the CERCLA process at Site 23 through public notification of the interim remedy and through numerous updates and presentations to the Picatinny Environmental Restoration Advisory Board (PAERAB). Prior to the existence of the PAERAB, the public was kept informed through the Technical Review Committee (TRC).

PAERAB members have provided comments regarding the selected remedial alternative. On April 14, 2001 representatives from the Picatinny Environmental Affairs Office hosted a tour of Site 23 for interested RAB members to see the entire site and ask questions regarding the proposal remedy. In 2003, a courtesy copy of the Proposed Plan was given to the PAERAB's co-chair, and a complimentary copy was offered to any PAERAB member who requested it. A final Proposed Plan for Site 23 was completed and released to the public in December 2003 at the information repositories listed below:

Installation Restoration Program Office
Building 319
Picatinny, NJ 07806

Rockaway Township Library
61 Mount Hope Road
Rockaway Township, NJ 07866

Morris County Library
30 East Hanover Ave
Whippany, NJ 07981

Multiple newspaper notifications were made to inform the public of the start of the Proposed Plan comment period, solicit comments from the public, and announce the public meeting. The notification was run in the Star Ledger and the Daily Record on December 5 and 12, 2003. A public comment period was held from Friday, December 5, 2003 to Monday, January 5, 2004, during which comments from the public were received. A public meeting was held on December 18, 2003, to inform the public about the Selected Remedy for Site 23 and to seek public comments. At this meeting representatives from the U.S. Army, NJDEP, USEPA, and the U.S. Army Corps of Engineers (USACE) were present to answer questions about the site and the alternatives under consideration. The Army's response to comments received at this meeting as well as those submitted by other means are included in the Responsiveness Summary, **Section 3** of this ROD.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

The removal of buried waste containers and scrap metal, and the placement of a soil cover at the DBA and NDA by the Army at Site 23 removed the principle threat waste at the site. Although follow-up studies found scattered, low levels of contamination, risk calculations found that the remaining contamination does not present unacceptable human and ecological risks with the implementation of the current remedial action.

The selected remedy for the site consists of the performance of long-term groundwater monitoring and implementation of LUCs as specified in the RD. Specific elements of the remedy will include:

- Groundwater Monitoring
  - Groundwater monitoring using the existing groundwater monitoring wells
  - Collection of surface water and sediment samples from the off-post spring and seep
- Collection of one round of surface soil samples from locations that have previously exhibited exceedances of the LOCs.
- Submission of a RD for Site 23
  - Submission as a primary document within the CERCLA Program
  - Review and approval of this plan by Army and regulatory stakeholders
- Implementation of Institutional Controls and LUCs as specified in the RD
  - To prevent human exposure to contaminated soil
  - To protect the vegetated soil cover
  - Inspection of the existing soil cover and fencing.

The lead agency for this action (the Army) is selecting the aforementioned remedial action for Site 23 and has deemed such action necessary to prevent human contact with contaminants detected in groundwater and fly ash buried at Site 23. One factor in this determination was the comparison of site data to NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC). It is the Army's current judgment that the Selected Remedy identified in this ROD is necessary to protect public health or welfare from exposure to contaminants detected in groundwater and the fly ash at Site 23. The action selected will be consistent with additional actions that may be applied in the future at other areas of Picatinny.

The remedy for Site 23 is not ecologically driven because Site 23 represents a small disturbed area within a larger area otherwise characterized as having suitable habitat for ecological receptors. In addition, the existing soil cover at Site 23 will prevent most future exposures and eliminate contaminant migration potential.

Because this remedy will result in pollutants or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure for a period of time, statutory reviews will be conducted every five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment until such time as it may be determined that the site qualifies for unrestricted use.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Characteristics

2.5.1.1 Topography/Surface Water Hydrology

Site 23 is located along the southeastern ridge of Picatinny and consists of hilly terrain with an approximate elevation of 840 to 900 ft msl. The site is situated between two hills along the ridge as shown on **Figure 3**. Surface water flows to both sides of the ridge. Surface water runoff is to the north and west along Old Post Road and also to the southeast towards several residences located near Richard Mine Road. Directions of surface water runoff are also shown on **Figure 3**. Based on the

topographic contours in the area, surface water runoff from the site is expected to be significant during storm events while infiltration is anticipated to be minimal because of the steep slopes and less permeable soils present at and near the site.

2.5.1.2 Surface and Subsurface Features

Site 23 consists of the DBA, NBA, and the Central Borrow Pit. Both the DBA and NBA were landfilled areas and are currently enclosed by perimeter fencing. The Central Borrow Pit, a cleared flat area located in the middle of the site, is open and currently contains a linear mound of brush, debris, and fill dirt. No surface or subsurface structures are present at Site 23.

2.5.1.3 Geology and Soils

The following summary of geologic conditions is based on drilling logs for the eleven monitoring wells installed at the site and a fracture trace analysis. Based on geologic cross sections of the site, bedrock elevation drops from approximately 850 ft msl at the northeastern boundary of Site 23 to approximately 785 ft msl in the southern end of the site. Similarly, bedrock elevation drops from 815 ft msl in the northwest portion of Site 23 to 790 ft msl in the southeastern portion of the site.

Site 23 is underlain by a veneer of glacial till ranging from three to twenty feet thick composed of subrounded boulders, cobbles, gravel, and coarse to fine sand in a silt and clay matrix. A zone of highly weathered gneiss boulders lies beneath the till layer. There is a light gray and medium-grained gneiss bedrock at depths ranging from 10 to 45 ft bgs. The gneiss, part of the Byram Intrusive Suite, is composed of quartz, feldspar, and biotite. The gneiss displays extensive high and low angle fracturing with some iron oxidation along the fractures. Many of the fractures have been filled or partially filled with mixtures of clay, sand, silt, and/or chlorite.

In 1998, the Army performed a fracture trace analysis of Site 23. The findings confirmed the presence of a photolinear feature associated with a fault. This fault is a northwest-trending fault located congruent and tangent to the southwestern tip of the landfill and access road to the site. The fault extends approximately 1,700 ft north of the landfill and crosses under Parker Road and extends 4,200 ft south of the landfill and crosses under a pond and extends approximately 500 ft southeast of Interstate 80. This fault is coincidental with the contact of the till and the till of the terminal moraine near the apartment complex located southeast of the site. For more detailed information, see the Draft Final Site 23 Fracture Trace Analysis Report (ICFKE, 1998a).

2.5.1.4 Hydrogeology

Eleven monitoring wells have been installed as part of previous investigations. **Table 2-1** provides a list of the monitoring wells located at Site 23. **Figure 3** presents the locations of the monitoring wells. Well depths range from 28 to 98 ft bgs. All wells, except for MW-14 and DM23-2, are screened in bedrock. DM23-2 is partially screened in bedrock and the glacial till overburden. MW-14 is completely screened in the glacial till overburden.

Based on the geology of Site 23, two separate aquifers have been identified. The aquifers include a glacial till/overburden aquifer and a bedrock aquifer. However, groundwater at Site 23 principally occurs in the Precambrian Gneiss bedrock. As a result, groundwater flow at the site is controlled by fractures inherent in the bedrock. Although most of the fractures encountered during drilling were filled or partially filled with clay, sand, silt, or chlorite, extensive fracturing, including highly permeable fracture zones, is evident in the bedrock beneath Site 23. Groundwater was encountered at depths ranging from approximately 10 to 40 ft bgs, and has shown significant seasonal variability.

Groundwater elevation contour maps indicate groundwater flows from the north to the south across the site. Based on the topography of the site, a groundwater divide may be present somewhere in the northern part of the site. The existing groundwater monitoring wells do not define this divide. Although no hydrogeologic data is available, the glacial till is expected to have a higher permeability than the underlying bedrock. Therefore, preferential groundwater flow may occur through this zone. The average hydraulic conductivity in the bedrock aquifer was calculated as 30 feet/day (ft/day) [1.1E-2 centimeters per second (cm/sec)], and the groundwater flow velocity was estimated to be 9.6 ft/day [3,504 feet per year (ft/yr)] (Dames and Moore, 1999a).

Table 2-1
Monitoring Wells Located at Site 23

Well Number	Screened Interval (ft bgs)	Aquifer	Source
MW23-1B	28-38	Bedrock	D&M, 1993
MW23-4B	38-48	Bedrock	D&M, 1993
MW23-5B	18-28	Bedrock	D&M, 1993
DM23-1	27-37	Bedrock	D&M, 1988
DM23-2	33-43	Overburden	D&M, 1988
DM23-3	35-45	Bedrock	D&M, 1988
MW-14	11-31	Overburden	D&M, 1981
23MW-1	38.9-48.9	Bedrock	ICFKE, 1996
23MW-2	29.4-39.4	Bedrock	ICFKE, 1996
23MW-3	88.3-98.3	Bedrock	ICFKE, 1996
23MW-4	42.5-52.5	Bedrock	ICFKE, 1996

Numerous seeps have been identified along a portion of the unnamed stream in an area that extends approximately 100 ft upstream from the northeastern edge of the Mountain View Manor parking lot **(Figure 3).** The presence of the seeps may be associated with groundwater flow along the fault, the contact between the till and the till of the terminal moraine, and/or lateral flow along the overburden/bedrock interface.

2.5.2 Summary and Findings of Site Investigations

Ten previous investigations have been conducted at Site 23: (1) USAEHA Groundwater Sampling, 1981-1983; (2) Dames and Moore SI, 1988; (3) USGS Geophysical Survey, 1990; (4) Chemical Waste Management Soil Sampling Program, 1990; (5) Weston Preliminary Assessment, 1991-1992; (6) Weston SI, 1992; (7) Weston Preliminary Subsurface Investigation, 1993-1994; (8) Dames and Moore Phase I RI, 1994; (9) ICFKE Additional RI, 1996; and (10) ICFKE Fracture Trace Analysis, 1998. A brief discussion of the ten previous investigations is provided below. A summary of the nature and extent of contamination observed at the site based on the two most recent investigations (1994 Phase I RI and 1996 Additional RI) is also presented.

In addition to the ten investigations performed prior to the FS for Site 23, groundwater and surface water monitoring have continued at the site. As of the publication date of this document, four rounds of groundwater/surface water have been collected at Site 23 quarterly, with the last round collected in December 2003.

2.5.2.1 USAEHA Groundwater Sampling, 1981-1983

In 1981, USAEHA installed monitoring well MW-14 at Site 23. Monitoring well MW-14 is located near the northern boundary of the DBA adjacent to Old Post Road. The monitoring well was installed in the unconsolidated glacial till deposits above bedrock and screened at a depth of 11 to 31 ft bgs. Well MW-14 was used to assess groundwater quality downgradient of the northern part of the DBA and the Central Borrow Pit. Between 1981 and 1983, monitoring well MW-14 was sampled three times for organic compounds. In addition, the March 1983 sample was analyzed for inorganic compounds. Analytical data did not indicate the presence of any organic or inorganic constituents in the groundwater

samples. Additional information regarding this investigation can be found in the Phase I RI Report (Dames and Moore 1998).

2.5.2.2 Dames and Moore SI, 1988

In April 1988, Dames and Moore performed a Site Investigation (SI) at Site 23. As part of the SI, three surface soil and three groundwater samples were collected to further assess whether past waste disposal activities had impacted soil and groundwater. The three surface soil samples were collected from the DBA and analyzed for total phenols and metals. Three bedrock monitoring wells (DM23-1, DM23-2, and DM23-3) were installed and sampled for total phenols and seven metals. Monitoring well DM23-3 is located near the northeastern corner of the site and serves as an upgradient well. Monitoring well DM23-2 is located in the DBA in the southern portion of Site 23. Well DM23-1 is located approximately 150 to 200 ft west of the Central Borrow Pit and hydraulically downgradient of the Northern Area.

Elevated levels of six metals (arsenic, cadmium, chromium, copper, lead, and silver) were present in surface soil. The presence of these metals was likely related to fly ash disposal in the area. Elevated levels of cadmium, nickel, iron, and manganese were detected at one monitoring well, located within the DBA. Additional information regarding this investigation can be found in the SI Report (Dames and Moore 1988).

2.5.2.3 USGS Geophysical Survey, 1990

In August 1990, the USGS conducted a reconnaissance survey at the Post Farm Landfill to locate buried and partially buried 55-gallon steel drums. The area of investigation was limited to the DBA. A visual field reconnaissance was first conducted to locate exposed and partially exposed drums. In addition, a radiometric and geophysical survey was conducted to locate potential buried metallic objects suspected to be 55-gallon drums. The geophysical survey consisted of a magnetometer survey and two gradiometer (i.e., metal detector) surveys. The survey identified 36 partially buried drums, as well as 36 geophysical anomalies that may correspond to buried metallic objects. Additional information regarding this investigation can be found in the Phase I RI Report (Dames and Moore 1998).

2.5.2.4 Chemical Waste Management Soil Sampling Program, 1990

Chemical Waste Management conducted two soil sampling programs at Site 23 in October 1990. Ten surface soil samples were collected either adjacent to or beneath exposed drums at the DBA, and seventeen additional surface soil samples were collected from selected locations at the DBA. All surface soil samples were analyzed for VOCs, base neutrals/acid extractables (BNAs), pesticides, polychlorinated biphenyls (PCBs), toxicity characteristic leaching procedure (TCLP) metals, and nitrate/nitrite. Four VOCs, 10 BNAs, three PCBs, and lead were detected in the soil samples. Additional information regarding this investigation can be found in the Phase I RI Report (Dames and Moore 1998).

2.5.2.5 Weston Preliminary Assessment, 1991

In 1991, Weston conducted a Preliminary Assessment of Site 23 to determine the potential impact of site activities on human health and the environment and to assess whether a non-time-critical removal action and/or additional investigations were necessary. The Preliminary Assessment included a review of existing documents and reports, an on-site reconnaissance survey, and interviews with Picatinny personnel. The Preliminary Assessment recommended that an SI and a non-time-critical removal action be performed to further investigate potential environmental impacts of drum disposal activities at the DBA. Additional information regarding this investigation can be found in the Removal Preliminary Assessment Report (Weston 1993).

2.5.2.6 Weston SI, 1992

Weston conducted a three-phased SI to investigate and identify the location of buried and partially buried drums at the DBA and evaluate the potential environmental impact to soil and groundwater.

A total of 171 drums (primarily 55-gallon) plus several smaller containers were removed from the DBA and the NBA. Trenches were excavated to confirm the removal of all buried material at Site 23. Following the removal of the buried material, soil samples were collected and the excavated area was

backfilled using clean soil. Finally, the excavated area was covered with 6-18 inches of soil and seeded to establish vegetation. Additional information regarding these investigations can be found in the Phase I, II, and III Removal Action Reports (Weston 1993).

2.5.2.7 Weston Preliminary Subsurface Investigation – Central Borrow Pit, 1993-1994

In 1993, Weston performed a preliminary subsurface investigation of the Central Borrow Pit to confirm contamination detected during the Phase II SI. Two surface soil samples and five soil samples from two soil borings were collected to characterize soils at the Central Borrow Pit. All soil samples were analyzed for VOCs, BNAs, and PCBs. One VOC and eight BNAs were detected below their associated regulatory criteria.

Fly ash is finely divided residue resulting from the combustion of coal. The ash is generally finer than cement and consists mainly of glassy-spherical particles as well as residues of hematite and magnetite, char, and some crystalline phases formed during cooling. The chemicals detected in the fly ash samples collected from Site 23 are further discussed in **Section 2.5.2.10**. Based on the results of previous investigations, the volume of fly ash is approximately 58,000 CY in the DBA and approximately 2,000 CY in the NBA (See **Figure 4**). Additional information regarding this investigation can be found in the Preliminary Subsurface Investigation Report (Roy F. Weston 1993).

2.5.2.8 Dames and Moore Phase I RI, 1994

Dames and Moore collected surface soil and groundwater samples at Site 23 as part of the Phase I RI. Dames and Moore also conducted a human health risk assessment (HHRA). A brief discussion of the samples that were collected at Site 23 as part of the Phase I RI is provided below.

Surface Soil. Two surface soil samples, MW23-4AA and MW23-5AA, were collected from the southwestern end of the site to determine if surface water runoff from the DBA may have affected surface soils. Both of the surface soil samples were collected from depths of 0 to 1 foot and were analyzed for VOCs, BNAs, metals, cyanide, pesticides/PCBs, explosives, dioxins/furans, and radiological parameters (i.e., gross alpha, beta, and gamma).

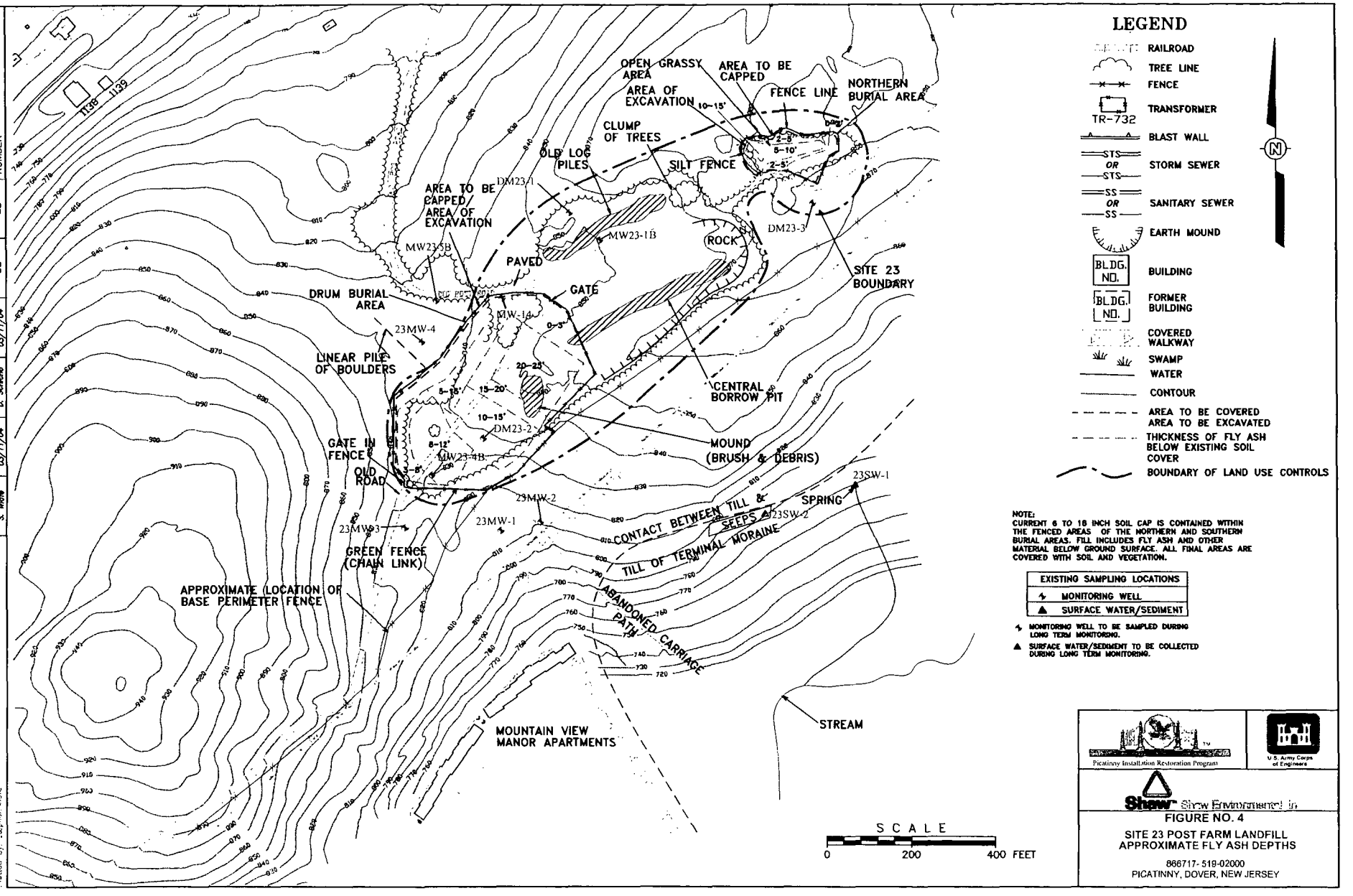
Groundwater. Three additional bedrock monitoring wells (MW23-1B, MW23-4B, and MW23-5B) were installed at Site 23 during the Phase I RI. Three rounds of groundwater sampling were conducted in November 1993, April 1994, and July 1994. The groundwater samples were analyzed for VOCs, BNAs, metals (filtered and unfiltered), cyanide, pesticides/PCBs, and explosives. Groundwater samples from monitoring wells DM23-1 and DM23-3 were also analyzed for dioxins/furans and radiological parameters

(i.e., gross alpha, beta, and gamma). Additional information regarding this investigation can be found in the Phase I RI Report (Dames and Moore 1998).

2.5.2.9 ICFKE Additional RI, 1996

The following field activities were conducted as part of the 1996 Additional RI: (1) completion of 10 soil borings, (2) collection of one surface water/sediment sample, (3) installation of four bedrock monitoring wells, and (4) collection of groundwater samples from the four newly installed and seven existing monitoring wells. Below is a brief discussion of the activities that were conducted as part of the 1996 Additional RI. Sampling locations are depicted on **Figure 4**.

Subsurface Soil Sampling. The results of the USGS Geophysical Survey (1990) were utilized to locate ten soil borings, 23SB-1 through 23SB-10, at the Post Farm Landfill. The ten borings were drilled and sampled on 5-ft intervals to bedrock at the site to investigate any subsurface geophysical survey findings, assess the effectiveness of removal action excavations, and identify any potential source(s) of contamination. The 0-2 foot samples from the soil borings were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. This first fraction was collected from directly below the fill material to a depth of 2 ft below that point. The remaining samples from the borings were analyzed for VOCs, SVOCs, and pesticides/PCBs. Three remaining sampling intervals from each boring were also analyzed for metals and radiological parameters. One sample from the four borings installed in the fly ash disposal areas (23SB-5, 23SB-6, 23SB-8, and 23SB-9) was analyzed for TCLP metals. Additionally, three of the borings at the DBA had three samples each analyzed for dioxins/furans. The first sample from the three borings was collected below the fill cover that was put in place to mitigate airborne migration of the ash.


LEGEND
RAILROAD
TREE LINE
FENCE
TRANSFORMER
TR-732
BLAST WALL
STS OR STS
STORM SEWER
SS OR SS
SANITARY SEWER
EARTH MOUND
BLDG. NO.
BUILDING
FORMER BUILDING
COVERED WALKWAY
SWAMP
WATER
CONTOUR
AREA TO BE COVERED AREA TO BE EXCAVATED
THICKNESS OF FLY ASH BELOW EXISTING SOIL COVER
BOUNDARY OF LAND USE CONTROLS
N
OPEN GRASSY AREA
AREA TO BE CAPPED
AREA OF EXCAVATION
FENCE LINE
NORTHERN BURIAL AREA
CLUMP OF TREES
OLD LOG PILES
SILT FENCE
AREA TO BE CAPPED/ AREA OF EXCAVATION
PAVED
ROCK
SITE 23 BOUNDARY
DRUM BURIAL AREA
GATE
LINEAR PILE OF BOULDERS
CENTRAL BORROW PIT
GATE IN FENCE
OLD ROAD
MOUND (BRUSH & DEBRIS)
CONTACT BETWEEN TILL & TILL OF TERMINAL MORAINE
SEEPS & SPRING
ABANDONED CARRIAGE PATH
APPROXIMATE LOCATION OF BASE PERIMETER FENCE
GREEN FENCE (CHAIN LINK)
MOUNTAIN VIEW MANOR APARTMENTS
STREAM
1138
1139
DM23-1
DM23-2
DM23-3
MW23-1B
MW23-3B
MW23-4B
MW-14
23MW-1
23MW-2
23MW-3
23MW-4
23SW-1
23SW-2
SCALE
0
200
400 FEET
NOTE:
CURRENT 6 TO 18 INCH SOIL CAP IS CONTAINED WITHIN THE FENCED AREAS OF THE NORTHERN AND SOUTHERN BURIAL AREAS. FILL INCLUDES FLY ASH AND OTHER MATERIAL BELOW GROUND SURFACE. ALL FINAL AREAS ARE COVERED WITH SOIL AND VEGETATION.
EXISTING SAMPLING LOCATIONS
MONITORING WELL
SURFACE WATER/SEDIMENT
MONITORING WELL TO BE SAMPLED DURING LONG TERM MONITORING.
SURFACE WATER/SEDIMENT TO BE COLLECTED DURING LONG TERM MONITORING.
Picatinny Installation Restoration Program
U.S. Army Corps of Engineers
Shaw Shaw Environmental, Inc.
FIGURE NO. 4
SITE 23 POST FARM LANDFILL
APPROXIMATE FLY ASH DEPTHS
866717-519-02000
PICATINNY, DOVER, NEW JERSEY
DRAWN BY S. White 03/11/04
CHECKED BY D. Schicke 03/11/04
APPROVED BY -- --
DRAWING NUMBER 23PF031104.dwg

The second sample from the borings was collected from within the buried fly ash. The final sample from each of the three borings was collected just beneath the fly ash.

Five surface soil and sixteen subsurface soil samples were collected from within the fly ash at Site 23. One SVOC (Mirex) and seven metals (Arsenic, beryllium, cadmium, copper, iron, lead and vanadium) were detected above their respective LOCs. Mirex was detected above its LOC of 0.35 mg/Kg in one subsurface soil sample (23SB-1B) at a concentration of 2.66 mg/Kg. Beryllium and cadmium exceeded their respective LOCs in fourteen samples ranging in concentration from 1.06 mg/Kg to 2.25 mg/Kg, and 1.19 mg/Kg to 12.4 mg/Kg, respectively. Arsenic exceeded its LOC in eight samples ranging in concentration from 21.4 mg/Kg to 79 mg/Kg. Iron exceeded its LOC in three samples ranging in concentration from 25,300 mg/Kg to 33,600 mg/Kg. Lead exceeded its LOC in two samples at concentrations of 181 mg/Kg and 2,990 mg/Kg. Copper and vanadium exceeded their respective LOCs at concentrations of 1,890 mg/Kg and 780 mg/Kg, respectively. **Table 2-2** provides a summary of analytes detected above their respective LOCs in fly ash samples.

Surface Water/Sediment Sampling. One surface water/sediment sample (23SW/SD-1) was collected from a spring located southeast of the Northern Area at Site 23. The surface water/ sediment sample was analyzed for VOCs, SVOCs, pesticides/PCBs, metals, dioxins/furans, and radiological parameters.

Monitoring Well Installation. Four shallow bedrock monitoring wells were installed at Site 23 as part of the additional RI. Three of the wells (23MW-1 through 23MW-3) were installed southeast of the site, just inside the Picatinny boundary. The fourth well (MW23-4) was installed west of Site 23 approximately 80 ft west of the DBA. The monitoring well borings were sampled on 5-ft intervals to bedrock. The soil samples from the four borings were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals.

Groundwater Sampling. Groundwater samples were collected from the four newly installed wells, as well as the seven existing wells at Site 23. The groundwater samples were analyzed for VOCs, SVOCs, metals, pesticides/PCBs, dioxins/furans, and radiological parameters. Additional information regarding this investigation can be found in the Site 23 Post Farm Landfill Additional Investigation Data Report (ICF Kaiser 1997).

2.5.2.10 ICFKE Fracture Trace Analysis, 1998

The primary purpose of the fracture trace analysis was to identify areas of fractured bedrock to gather information regarding the potential direction of groundwater movement at the Post Farm Landfill and evaluate the effectiveness of the current monitoring well network to capture groundwater flow. The general approach used to conduct the fracture analysis included using aerial photos and a site reconnaissance.

Based upon the results of the fracture trace analysis, two significant flow paths were identified from the southern drum burial area. The first is lateral flow on the bedrock surface to the east and west. The second is flow in the fault zone located along the southern end of the landfill. It was the recommendation of this investigation that no further action be taken to more clearly characterize the groundwater flow paths at Site 23 and that the current monitoring well network be used to monitor groundwater flow. Additional information regarding this investigation can be found in the Site 23 Post Farm Landfill Fracture Trace Analysis Report (ICF Kaiser 1998).

2.5.2.11 USACE, New York District, Field Inspection of 53 Areas Sensitive for Cultural Resources and Phase 1B Archaeological Surveys of Eight Sensitive Areas at Picatinny Arsenal, 1998

A Phase I cultural resource investigation was conducted at eight selected sites at Picatinny. The purpose of the study was to evaluate and refine the existing archaeological sensitivity models and to conduct a cultural/archaeological survey of one hundred acres in eight sensitivity areas.

One of the areas surveyed was a hill top ridge just to the south of Site 23. Shovel tests turned up possible lithic points. The study concluded that while this area would not be disturbed by activities at Site 23, grubbing or digging activities outside the disturbed area of Site 23 should be cognizant of the nearby archeological sensitive area.

Table 2-2
Summary of Analytes Exceeding LOCs Detected in Fly Ash Samples

			Analytical Results (b)									
			23SB-1A	23SB-1B	23SB-2A	23SB-5A	23SB-5B	23SB-5C	23SB-5D	23SB-6A	23SB-6B	23SB-7A
	LOC (a)/Sample Depth (ft)		0.5 - 2	5 - 6	0.5 - 2	1 - 2	7 - 9	10 - 12	14 - 15	1.5 - 3	6.7 - 7	1 - 2
Chemical	Surface Soil	Subsurface Soil	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semivolatiles (mg/Kg):												
Mirex	0.35	0.35	0.25 U	**2.66**	0.25 U	0.25 U	0.521 U	0.535 U	0.38 U	0.25 U	0.364 U	0.25 U
Inorganics (mg/Kg):												
Arsenic	20	20	11.9	**30.4**	7.26	12	**32.8**	**21.4**	4.17	10.9	8.61	16.6
Beryllium	1	1	**1.79**	0.995	**1.06**	**1.08**	**1.77**	**1.71**	0.975	0.754	0.955	**1.14**
Cadmium	1	1	**12.4**	**5.31**	**1.86**	**5.43**	**1.89**	0.7 U	0.7 U	**1.64**	0.7 U	**2.28**
Copper	600	600	256	256	47.8	25.6	25.6	27.1	15.8	27	14.3	**1890**
Iron	23000	23000	**28400**	12900	16400	15200	10100	9010	17100	11200	9310	21000
Lead	100	100	**2990**	**181**	42.5	11.3	12.5	7.15	6.07	23.8	8.73	35.4
Vanadium	370	370	**780**	46.9	36.3	30.3	111	158	62.9	28	67.8	37.6

(a) See the "ARARs and Other Guidance to be Considered for Picatinny Arsenal Phase II Surface and Subsurface Soil" table for a complete list of LOC values.

(b) Samples with a depth of 0-2 feet were compared to surface soil LOCs and samples with a depth greater than 2 feet were compared to subsurface soil LOCs.

LOC = Level of Concern

Bolded and shaded values indicate detected result is above the LOC.

Flags/Qualifiers:

U = Non-detect, value is the detection limit.

Table 2-2 (Continued)
Summary of Analytes Exceeding LOCs Detected in Fly Ash Samples

Chemical	LOC (a)/Sample Depth (ft) Surface Soil	Subsurface Soil	Analytical Results (b) 23SB-7B 5 - 7 Result	23SB-7C 10 - 12 Result	23SB-7D 15 - 16.5 Result	23SB-8A 1.5 - 2.5 Result	23SB-8B 5 - 7 Result	23SB-8C 10 - 12 Result	23SB-8D 15 - 16.5 Result	23SB-9A 1 - 2 Result	23SB-9B 5 - 7 Result	23SB-9C 10 - 12 Result	23SB-10B 5 - 7 Result
Inorganics (mg/Kg):													
Arsenic	20	20	**27.5**	**54**	19.3	7.28	9.54	**79**	3.29	**24.3**	9.84	**30**	11.8
Beryllium	1	1	**1.74**	**1.97**	**1.44**	0.758	**1.71**	**2.25**	0.815	**1.66**	0.5 U	**1.27**	**1.32**
Cadmium	1	1	**4.46**	**3.29**	**3.95**	**3.13**	0.7 U	0.7 U	0.7 U	**1.19**	**1.7**	0.7 U	**1.2**
Copper	600	600	111	38	22.7	27.6	24.3	30.6	13.7	100	57.9	30.8	42.2
Iron	23000	23000	**25300**	**33600**	13900	13100	5370	16400	16400	15100	17100	18600	11900
Lead	100	100	24.6	11.1	17.9	12	4.98	11.5	8.05	15.5	15.8	12.7	18
Vanadium	370	370	95.6	125	89.8	23.3	38.8	293	25.9	119	73.1	92.7	45

(a) See the "ARARs and Other Guidance to be Considered for Picatinny Arsenal Phase II Surface and Subsurface Soil" table for a complete list of LOC values.

(b) Samples with a depth of 0-2 feet were compared to surface soil LOCs and samples with a depth greater than 2 feet were compared to subsurface soil LOCs.

LOC = Level of Concern

Bolded and shaded values indicate detected result is above the LOC.

Flags/Qualifiers:

U = Non-detect, value is the detection limit.

2.5.2.12 Shaw E&I Quarterly Groundwater/Surface Water Sampling 2003

Subsequent to the completion of the FS, four rounds of groundwater sampling have been performed in 2003. Groundwater samples were collected quarterly from ten wells (eleven wells in fourth quarter) located at Site 23. In addition, two surface water samples were collected. The groundwater and surface water samples were analyzed for VOCs, SVOCs, metals, pesticides/PCBs, dioxins/furans, and radiological parameters.

2.5.2.13 Summary of Environmental Contamination

Several investigations of surface and subsurface soil, groundwater, surface water, and sediment that have previously been conducted at Site 23 have detected contaminants, including metals, VOCs, SVOCs, radiological parameters, and dioxins/furans. Numerous chemical compounds have been detected at Site 23; however, the majority of detections have been low level and scattered throughout the site. Chemical contamination at Site 23 does not exhibit a clearly discernable pattern or source area but rather indicates dispersed, low-level contamination by multiple chemical compounds as a result of past disposal practices.

Detailed data tables and discussion of historical data can be found in the Site 23 Data Report and Additional Investigation Work Plan (ICFKE, 1998b) and the FS for Site 23, [IT Corporation (IT), 2001], all of which are available in the Picatinny Administrative Record.

Surface Soils

Two SVOCs were detected in surface soils at concentrations that exceeded LOCs. Benzo(a)pyrene was detected in 2 out of 18 surface soil samples at a maximum concentration of 1.8 milligrams per kilogram (mg/kg) as compared to the LOC of 0.66 mg/kg while benzo(b)fluoranthene was detected in 4 out of 18 surface soil samples at a maximum concentration of 9.8 mg/kg as compared to the LOC of 4 mg/kg.

Four inorganic compounds were detected in surface soil samples at concentrations that exceeded LOCs. Arsenic and lead were both detected in 18 of 18 surface soil samples at maximum concentrations of 24.3 mg/kg and 2,990 mg/kg, respectively. The LOCs for arsenic and lead are 20 mg/kg and 600 mg/kg, respectively. Thallium was present in 12 of 18 samples at a maximum concentration of 161 mg/kg compared to the LOC of 2 mg/kg. Copper was also detected in 18 of 18 samples at a maximum concentration of 1,890 mg/kg compared to an LOC of 600 mg/kg.

Subsurface Soils

Two inorganic compounds, arsenic and beryllium, were detected in subsurface soil samples at concentrations that exceeded LOCs. Arsenic was detected in 26 of 26 subsurface soil samples at a maximum concentration of 79 mg/kg compared to the LOC of 20 mg/kg. Beryllium was detected in 21 of 26 subsurface soil samples at a maximum concentration of 2.25 mg/kg compared to the LOC of 2 mg/kg. Numerous other inorganics/metals were also detected during subsurface sampling but concentrations were below LOCs.

The compounds identified in site surface and subsurface soils have not significantly impacted the groundwater beneath the site. Because no unacceptable impact to groundwater has occurred from these compounds and the fact that the existing soil cover reduces the amount of water infiltration in the contaminated areas, impact to groundwater from these contaminants is not a concern.

Sediment

Neither the federal government nor the State of New Jersey has promulgated standards, requirements, criteria and/or limitations that are applicable or relevant and appropriate for Site 23 sediment. Analytical results from one sediment sample collected downstream show that only two contaminants, lead and manganese, were detected at concentrations that slightly exceeded the Ontario Ministry of the Environment and Energy (OMEE) criteria. Therefore, sediments are not a concern at Site 23. Maximum concentrations of the two compounds were 39.3 mg/kg and 521 mg/kg for lead and

manganese, respectively. The OMEE criteria for lead and manganese are 31 mg/kg and 460 mg/kg, respectively.

Surface Waters

Prior to 2003 quarterly sampling, there were no concentrations of contaminants in surface waters that exceeded LOCs. However, arsenic at a concentration of 2.3 µg/L was detected in one surface water sample (PFSPRG) collected during the 2003 sampling event. The LOC for arsenic in surface water is 1.38 µg/L.

Groundwater

One VOC, cis-1,2-dichloroethene (cis-1,2-DCE), was detected in 2 out of 26 groundwater samples at an average concentration of 15.0 micrograms per liter (µg/L) and a maximum concentration of 23 µg/L. The LOC for cis-1,2-DCE is 10 µg/L. Cis-1,2-DCE exceeded its LOC in 1 out of 43 groundwater samples collected during the 2003 quarterly sampling events.

Two dioxins/furans were also detected in groundwater samples collected at Site 23. 2,3,7,8-TCDD and OCDD were each detected in 1 out of 6 samples collected at concentrations of 0.00019 µg/L and 0.00053 µg/L, respectively. The LOCs for these compounds are 0.00003 µg/L and 0.00045 µg/L. No dioxins/furans were detected at concentrations greater than their respective LOCs during the 2003 sampling events.

Sampling conducted in 1996 by ICFKE revealed five inorganic compounds in Site 23 groundwater at concentrations that exceeded LOCs. Aluminum was detected in 8 of 11 samples at a maximum concentration of 22,700 µg/L compared to the LOC of 200 µg/L. Boron was detected in 4 of 11 samples at a maximum concentration of 661 µg/L compared to the LOC of 600 µg/L. Cadmium was detected in 2 of 11 samples at a maximum concentration of 18.7 µg/L compared to the LOC of 4 µg/L. Iron and lead were each detected in 9 of 11 groundwater samples at maximum concentrations of 65,300 and 20.4 µg/L, respectively. The LOCs for iron and lead are 300 µg/L and 10 µg/L, respectively. Numerous other inorganic compounds were also detected during groundwater sampling but concentrations were below LOCs.

Sampling conducted in 2003 revealed seven inorganic compounds in Site 23 groundwater at concentrations that exceeded LOCs. Aluminum exceeded its LOC in 20 of 43 samples and was detected at a maximum concentration of 11,400 µg/L. Cadmium exceeded its LOC in 7 of 43 samples and was detected at a maximum concentration of 14.7 µg/L. Iron exceeded its LOC in 17 of 43 samples and was detected at a maximum concentration of 23,800 µg/L. Lead did not exceed its LOC in any of the groundwater samples collected during the 2003 quarterly sampling event. Manganese exceeded its LOC in 11 of 43 samples and was detected at a maximum concentration of 4,510 µg/L. Thallium exceeded its LOC (0.5 µg/L) in 10 of 43 samples and was detected at a maximum concentration of 9.0 µg/L. Nickel and vanadium exceeded their respective LOCs in 1 of 43 groundwater samples at concentrations of 196 and 12.7 µg/L, respectively. The LOCs for nickel and vanadium are 100 µg/L and 11 µg/L, respectively.

Three radiological parameters, gross-alpha, gross-beta, and Radium-226 were present in several of the groundwater samples collected during the 1996 sampling conducted by ICFKE. Gross-alpha was detected in 17 of 27 groundwater samples at a maximum concentration of 128 picocuries per liter (pCi/L) compared to the LOC of 15 pCi/L. Gross-beta was detected in 22 of 27 samples at a maximum concentration of 186 pCi/L. There is no LOC for gross beta. Radium was detected in 2 of 27 groundwater samples at a maximum concentration of 78.7 pCi/L compared to the LOC of 5 pCi/L.

During the 2003 quarterly sampling conducted by Shaw E&I, Gross-alpha was detected in 18 of 43 groundwater samples at a maximum concentration of 175 picocuries per liter (pCi/L) compared to the LOC of 15 pCi/L. Gross-alpha exceeded its LOC in one sample. Gross-beta was detected in 34 of 43 samples at a maximum concentration of 170 pCi/L. Radium was detected in 16 of 43 groundwater samples at a maximum concentration of 286 pCi/L compared to the LOC of 5 pCi/L. Radium exceeded its LOC in 11 samples.

2.5.3 Characterization of Contaminants of Concern (COCs)

Contaminants identified as COCs in groundwater at Site 23 include aluminum, cadmium, iron, lead, radium, silver, 1,2-dichloroethene (1,2-DCE), 2,3,7,8-TCDD, gross alpha, and gross beta. No COCs have been identified for surface and subsurface soils, sediment, or surface water at Site 23. Additional information on the identification of COCs is presented in Section 2.7 of this document.

2.5.4 Conceptual Site Model

Various types of industrial wastes were disposed in the DBA and NBA at Site 23. The drums disposed at Site 23 may have leaked some of their contents into the surrounding soils. Once present in the soil, contaminants were likely transported to groundwater through infiltration of surface runoff. Contaminants present in groundwater are transported through advective transport. At Site 23, groundwater discharge into the adjacent stream may transport these contaminants to surface water, with some contaminants adsorbing to the sediment.

The fly ash buried at Site 23 is currently covered with a soil cover. Exposure to the fly ash may occur if excavation activities were to be conducted at Site 23. The fly ash would not be transported from its current location in the absence of site disturbance activities. Soils impacted by the formerly buried drums remain at the site. Industrial receptors could potentially be impacted by these residual contaminants through improper land use (i.e. excavation without safeguards). Residential receptors could potentially be impacted by residual contaminants in site soil.

The buried drums at Site 23 were removed during a removal action in 1993. Therefore, the source of contaminants detected in groundwater has likely been addressed at Site 23. However, the low levels of contaminants detected in groundwater may discharge into the adjoining stream. Over the long term, contaminants present in groundwater would likely be attenuated due to natural processes such as biodegradation, adsorption, dilution, etc.

Figure 5 presents a graphical representation of the Site 23 Conceptual Site Model.

2.6 CURRENT AND POTENTIAL FUTURE LAND USES

Site 23 is undeveloped and the current land use designation for the site is for training. As such, it is currently an active U.S. Army industrial site. The Central Borrow Pit is intermittently utilized for the placement of landscaping debris and currently contains a linear mound of brush, debris, and dirt fill.

The area surrounding the site is located within Hunting Area 1. Hunting Area 1 is open to hunting activities for any game legal in the State of New Jersey. The DBA and the NBA are currently capped with 6 – 18 inches of clean fill soils. Vegetative growth covers both sites. Perimeter fencing currently surrounds both the DBA and the NBA. Therefore, these areas are not utilized for hunting.

Future development of the 10.3 acres of land defined as Site 23 will be consistent with the remedy and acceptable risk exposure scenarios discussed in this ROD. At this moment in time, an Environmental Assessment is being developed to evaluate Site 23 land use for a public/private partnership. Residential land use will not be allowed at Site 23.

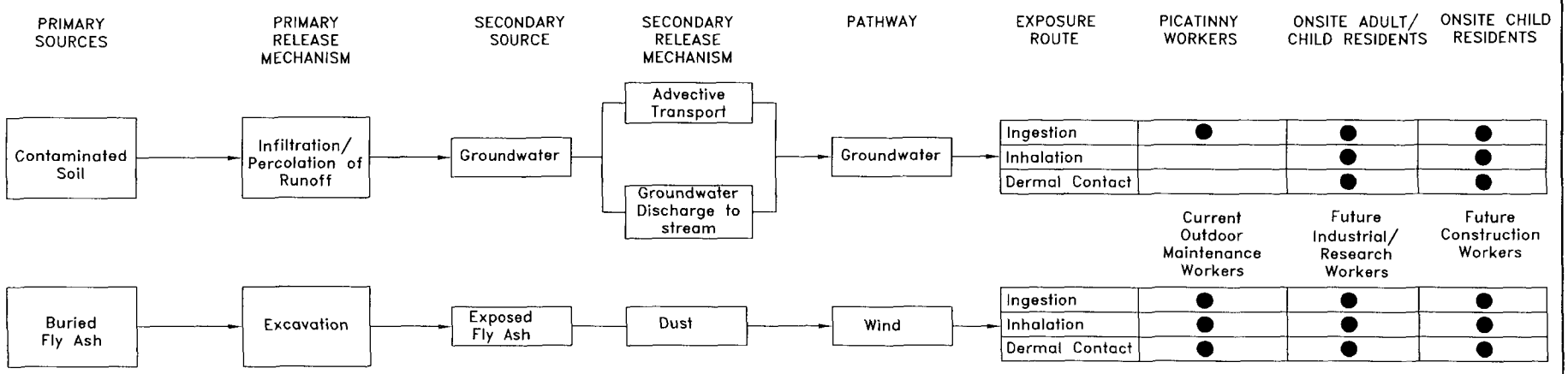
2.7 SUMMARY OF SITE RISKS

2.7.1 Human Health Risk Assessment

As discussed in the FS for Site 23 (IT, 2001) and accepted by USEPA in various correspondence, the risk and hazard estimates presented below are based on the Phase I RI (Dames and Moore, 1999a). Two samples were collected from within the DBA area containing buried fly ash. Although this risk assessment was based on only two samples, it did not identify unacceptable risk for Site 23. The soil sampling data collected subsequent to this risk assessment did not reveal levels of contaminants significantly different from those identified during the Phase I RI. Therefore, no unacceptable risk exists at Site 23 due to potential exposure of industrial receptors to surface soils. No residential land use scenarios were evaluated in the risk assessment.

As part of the HHRA, the carcinogenic risk and noncarcinogenic hazard was evaluated for the following three populations: current outdoor maintenance workers, future industry/research workers, and future construction/excavation workers. Carcinogenic risk falls within the NCP target range of concern

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
S. Wade 03/09/04	D. Schicho 03/09/04	D. Schicho --	23PF031104-FIG-5



Exposure routes shown in this model demonstrate possible exposure scenarios, and do not represent the expectation that receptors will be exposed to contaminant. It should also be noted that the Institutional Controls in place would preclude many of the possible exposure scenarios shown herein.

Picatinny Installation Restoration Program

U.S. Army Corps of Engineers

Shaw Shaw Environmental, Inc.

FIGURE 5

CONCEPTUAL SITE MODEL
FOR SITE 23 ROD
866717-519-02000
PICATINNY, DOVER, NEW JERSEY

(1E-04 to 1E-06) for all three populations, ranging from 1E-06 for current outdoor maintenance workers to 1E-05 for future industry/research workers.

Estimated excess cancer risk for future construction/excavation workers is 2E-06. The noncarcinogenic hazard was equal to the hazard index (HI) criterion of 1 for future industry/research workers. The noncarcinogenic hazard was less than 1 for current outdoor maintenance workers and future construction/excavation workers. Therefore, no unacceptable risk was found in Site 23 soils.

There are Maximum Contaminant Level (MCL) exceedances of certain compounds in groundwater samples collected at the Post Farm Landfill (1 VOC, 1 dioxin/furan, 4 metals, and 3 radionuclides). MCL exceedances indicate the potential for human health risk if water, containing contaminants at levels greater than MCLs, is used for a potable water source. Long-term exposure through drinking, showering, etc. could result in excess human health risk. The groundwater Risk Assessment was performed area wide, as part of the Phase I Remedial Investigation (Dames and Moore, 1999b). No groundwater risk assessment was performed specifically for Site 23.

The risk characterization summary for soil is presented in **Table 2-3**.

2.7.1.1 Identification of Chemicals of Concern

COCs were identified for groundwater in the FS for Site 23 (IT, 2001). The starting point for the development of the list of COCs is the entire list of contaminants that were detected in Site 23 samples. These contaminants are listed in Tables 1-2, 1-3, 1-4, 1-5, 1-6, and 1-7 of the FS for Site 23 (IT, 2001). In these tables, the lists of COCs were developed by comparing detected concentrations to screening criteria. These screening criteria are a compilation of several State and Federal detection databases and have been chosen based upon several factors such as site geology, hydrology, environmental receptors, chemical toxicity, etc.

Surface and Subsurface Soils

The lack of risk due to exposure to surface soils indicates that there are no COCs associated with Site 23 surface or subsurface soils. Based on a comparison of contamination found in surface and subsurface soils to that of groundwater, no continued impact to groundwater is expected.

Sediment

As previously discussed in this Proposed Plan, there are no COCs associated with sediment at Site 23 because there are no ARARs for sediment. Additionally, LOCs were only slightly exceeded by two naturally occurring metals.

Groundwater

Metals identified as COCs in groundwater include aluminum, cadmium, iron, lead, radium, and silver. Gross alpha, gross beta, 1,2-DCE, and 2,3,7,8-TCDD were also determined to be COCs. OCDD was not retained as a COC because the contaminant of potential concern (COPC) exceeded the LOC in a sample collected from monitoring well DM23-3 in November 1993, but was not present in the sample collected from the same well in January 1997. Several metals boron, manganese, thallium, vanadium and nickel exceeded LOCs in groundwater but were not selected as COCs. The 1996 data set was used for the development of the COC list. If exceedance conditions from the older rounds of data were not reproduced in the 1996 round, the compound was not included as a COC. Boron was not considered a COC because no groundwater ARAR exists for this compound.

Table 2-4 presents a summary of the groundwater COCs, their maximum detected concentrations, and the associated ARARs.

Surface Water

There were no COCs identified or associated with surface waters at Site 23 since the LOCs were not exceeded.

Table 2-3
Risk Characterization Summary For Site 23

Scenario Timeframe: Current
Receptor Population: Outdoor Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Shallow Soil	Benzo(a)anthracene	2E-08	NA	NA	2E-08
Soil	Soil	Shallow Soil	Benzo(b)fluoranthene	1E-07	NA	NA	1E-07
Soil	Soil	Shallow Soil	Beryllium	8E-08	2E-09	NA	8.2E-08
Soil	Soil	Shallow Soil	Cadmium	NA	1E-08	NA	1E-08
Soil	Soil	Shallow Soil	PCBs-Total	7E-08	NA	9E-07	9.7E-07
Soil	Soil	Shallow Soil	1234678-HPCDD	3E-09	3E-11	4E-08	4.3E-08
Soil	Soil	Shallow Soil	2,3,7,8-TCDF	2E-08	2E-10	2E-07	2.2E-07
Soil	Soil	Shallow Soil	OCDD	6E-09	6E-11	7E-08	7.6E-08
						Total Risk=	**1E-06**

Scenario Timeframe: Future
Receptor Population: Industrial/Research Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Shallow Soil	Benzo(a)anthracene	2E-07	NA	NA	2E-07
Soil	Soil	Shallow Soil	Benzo(b)fluoranthene	1E-06	NA	NA	1E-06
Soil	Soil	Shallow Soil	Beryllium	1E-06	3E-08	NA	1E-06
Soil	Soil	Shallow Soil	Cadmium	NA	1E-07	NA	1E-07
Soil	Soil	Shallow Soil	PCBs-Total	9E-07	NA	6E-06	6.9E-06
Soil	Soil	Shallow Soil	1234678-HPCDD	4E-08	4E-10	2E-07	2.4E-07
Soil	Soil	Shallow Soil	2,3,7,8-TCDF	2E-07	3E-09	1E-06	1.2E-06
Soil	Soil	Shallow Soil	OCDD	7E-08	8E-10	4E-07	4.7E-07
						Total Risk=	**1E-05**

Table 2-3
Risk Characterization Summary (Continued)

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Shallow Soil	Benzo(a)anthracene	7E-08	NA	NA	7E-08
Soil	Soil	Shallow Soil	Benzo(b)fluoranthene	4E-07	NA	NA	4E-07
Soil	Soil	Shallow Soil	Beryllium	3E-07	1E-07	NA	4E-07
Soil	Soil	Shallow Soil	Cadmium	NA	6E-07	NA	6E-07
Soil	Soil	Shallow Soil	PCBs-Total	2E-07	NA	2E-07	4E-07
Soil	Soil	Shallow Soil	1234678-HPCDD	1E-08	2E-09	7E-09	1.9E-08
Soil	Soil	Shallow Soil	2,3,7,8-TCDF	7E-08	1E-08	4E-08	1.2E-07
Soil	Soil	Shallow Soil	OCDD	2E-08	3E-09	1E-08	3.3E-08
						Total Risk=	**2E-06**

2.7.2 Ecological Risk Assessment

During the planning of the Phase I Ecological Risk Assessment, a qualitative habitat survey of all the Phase I sites was conducted. It was determined that risk assessments would be performed at those sites that represented the greatest perceived risk to ecological receptors or sites that would be most representative of conditions at other unevaluated sites in a study area. Site 23 consists of a cleared borrow pit area and a recently remediated area with a new soil cover. Because the new soil cover would prevent most future exposures and eliminate migration potential and there were relatively few contaminants detected in surface soil, it was determined that conducting an ecological risk assessment at this site was unnecessary. In addition, Site 23 represents a small, disturbed area in an area otherwise characterized as having suitable habitat for ecological receptors.

2.8 REMEDIAL ACTION OBJECTIVES

The remedial action objectives for Site 23 were developed to assure the protection of human health and the environment. The objectives are specific to contaminated surface soils, subsurface soils, groundwater, surface water, and sediment originating from Site 23. The remedial action objectives for this site are as follows:

Prevent human exposure to groundwater contaminated with constituents of concern at levels greater than the chemical-specific ARARs through protection of points of compliance;

- Prevent human exposure to and spread of fly ash and contaminated soil;
- Protect uncontaminated on-post groundwater for future use;
- Protect off-post groundwater, surface water, sediment, and soils for unlimited use; and,
- Prevent human exposure to surface soils contaminated with constituents of concern at levels greater than the chemical-specific LOCs.

Table 2-4
Maximum Concentrations of COCs in Groundwater

Compound	Maximum Concentration (µg/L)	ARAR	
		(µg/L)	Basis
Aluminum	22,700	200	NJ GWQC
Cadmium	18.7	4	NJ GWQC
Iron	65,300	300	NJ GWQC
Lead	20.4	10	NJ GWQC
Radium	78.7	5	Federal MCL
Silver	4.11	2	NJ PQL
Gross Alpha	125 (pCi/L)	15 (pCi/L)	Federal MCL
1,2-DCE	23	10	NJ GWQC
2,3,7,8-TCDD	0.00019	0.00003	Federal MCL

NJ GWQC – New Jersey Groundwater Quality Criteria
NJ PQL – New Jersey Practical Quantitation Limit
MCL – Maximum Contaminant Level

2.9 DESCRIPTION OF ALTERNATIVES

The selected remedy for Site 23 is Alternative 5, Groundwater Monitoring and Implementation of LUCs. Site 23 has undergone a Remedial Investigation/Feasibility Study (RI/FS) in accordance with the CERCLA process. The RI phase is the mechanism for collecting data to characterize the site and assess potential human health and ecological risk. The RI phase is followed by the FS phase, which involves the development, screening, and detailed evaluation of remedial alternatives. Based on the findings of the Picatinny Site 23 – Post Farm Landfill Additional Investigation Data Report (ICFKE, 1997) and the

Picatinny Phase I RI Report (Dames and Moore, 1998), an FS was prepared to determine applicable treatment technologies and to assemble these technologies into remedial alternatives. Five general response actions were identified for groundwater at Site 23 including: No Action, Institutional Controls, Containment, Ex-Situ Treatment, and In-Situ Treatment. The general response actions identified for soil/fly ash included: No Action, Institutional Controls, Containment, Removal, On-Site Treatment, and Disposal. Numerous remedial technologies were identified for each general response action and process options of each remedial technology were screened based on effectiveness, implementability, and cost. This information is provided in detail in the FS for Site 23 (IT, 2001).

The following seven alternatives were identified and considered in the FS:

- Alternative 1: No Action.
- Alternative 2: Improvement of the Existing Vegetated Soil Cover, Implementation of LUCs, and Groundwater Monitoring; (Retained for detailed analysis).
- Alternative 3: Installation of a Multi-Layer Cap, Implementation of LUCs, and Groundwater Monitoring; (Eliminated based on effectiveness, implementability, or cost).
- Alternative 4: Excavation and Off-Post Disposal of Fly Ash, Implementation of LUCs, and Groundwater Monitoring; (Retained for detailed analysis).
- Alternative 5: Groundwater Monitoring and Implementation of LUCs; (Retained for detailed analysis).
- Alternative 6: Excavation, On-Site Fixation, Implementation of LUCs, and Groundwater Monitoring; (Eliminated based on effectiveness, implementability, or cost).
- Alternative 7: Excavation and Off-Post Disposal of Fly Ash and Groundwater Extraction/Treatment and Implementation of LUCs, and Groundwater Monitoring; (Eliminated based on effectiveness, implementability, or cost).

The preliminary screening of alternatives using effectiveness, cost, and implementability as criteria resulted in the following remedial alternatives retained for detailed analysis:

- Alternative 1: No Action.
- Alternative 2: Improvement of the Existing Vegetated Soil Cover, Implementation of LUCs, and Groundwater Monitoring.
- Alternative 4: Excavation and Off-Post Disposal of Fly Ash, Implementation of LUCs, and Groundwater Monitoring.
- Alternative 5: Groundwater Monitoring and Implementation of LUCs (Selected Remedy).

A description of the alternatives retained for detailed analysis with estimated costs is presented below:

2.9.1 Alternative 1: No Action

Capital Cost: $ 0

Operation & Maintenance

(O&M) Cost: $ 0

Present Worth: $ 0

CERCLA and the NCP require that a No Action alternative be evaluated at every site to establish a baseline for the comparison of other remedial alternatives. Under this alternative, no remedial action would take place.

2.9.2 Alternative 2: Improvement of the Existing Vegetated Soil Cover, Implementation of LUCs, and Groundwater Monitoring

Estimated Capital Cost: $ 481,397

Estimated O&M Cost: $ 319,842

Present Worth: $ 801,238

(Present worth O&M/Replacement 30 years, calculated using a 7% discount rate)

This containment option uses a vegetated soil cover to prevent exposure to the fly ash. As presented on **Figure 6**, approximately four acres [17,000 square feet (ft^2) in the NBA and 146,000 ft^2 in the DBA] would need to be contained by a soil cover in this remedial option. If selected, this cap will be implemented in accordance with recommendations from the U.S. Fish and Wildlife Service guidance on the seed mixture to be used on the cover.

The soil cover will consist of two layers. First a common earth fill layer will be placed over the contaminated area. This layer may consist of certified clean (shown to be free of contaminants through laboratory analysis) soil from on- or off-site sources, and will be placed to a thickness of 12 inches. The purpose of this layer is to provide a buffer between the fly ash and possible future site activities, and to provide adequate drainage to eliminate water-ponding. The common earth fill layer would be placed in two uniform 6-inch lifts and would be compacted to visual non-movement. Then, a 12-inch-thick layer of vegetative soil would be placed above the common earth fill layer. The purpose of this layer is to provide soil suitable for growth of vegetation. The topsoil layer would also be compacted to visual non-movement, and seeded to provide a vegetative cover that will aid in minimizing surface soil erosion.

The existing groundwater monitoring wells would be used to conduct long-term groundwater monitoring as part of this alternative. Samples would initially be collected quarterly to monitor the concentrations of contaminants in the site wells and to ensure that COCs in groundwater do not migrate from the site at concentrations that would be harmful to human health or the environment. Additionally, the off-post spring and seep will be sampled as part of the groundwater-monitoring program. Well locations are presented on **Figure 7**. This groundwater-monitoring program will be modified and/or abandoned based upon the site-specific exit strategy that will be developed in the RD for Site 23.

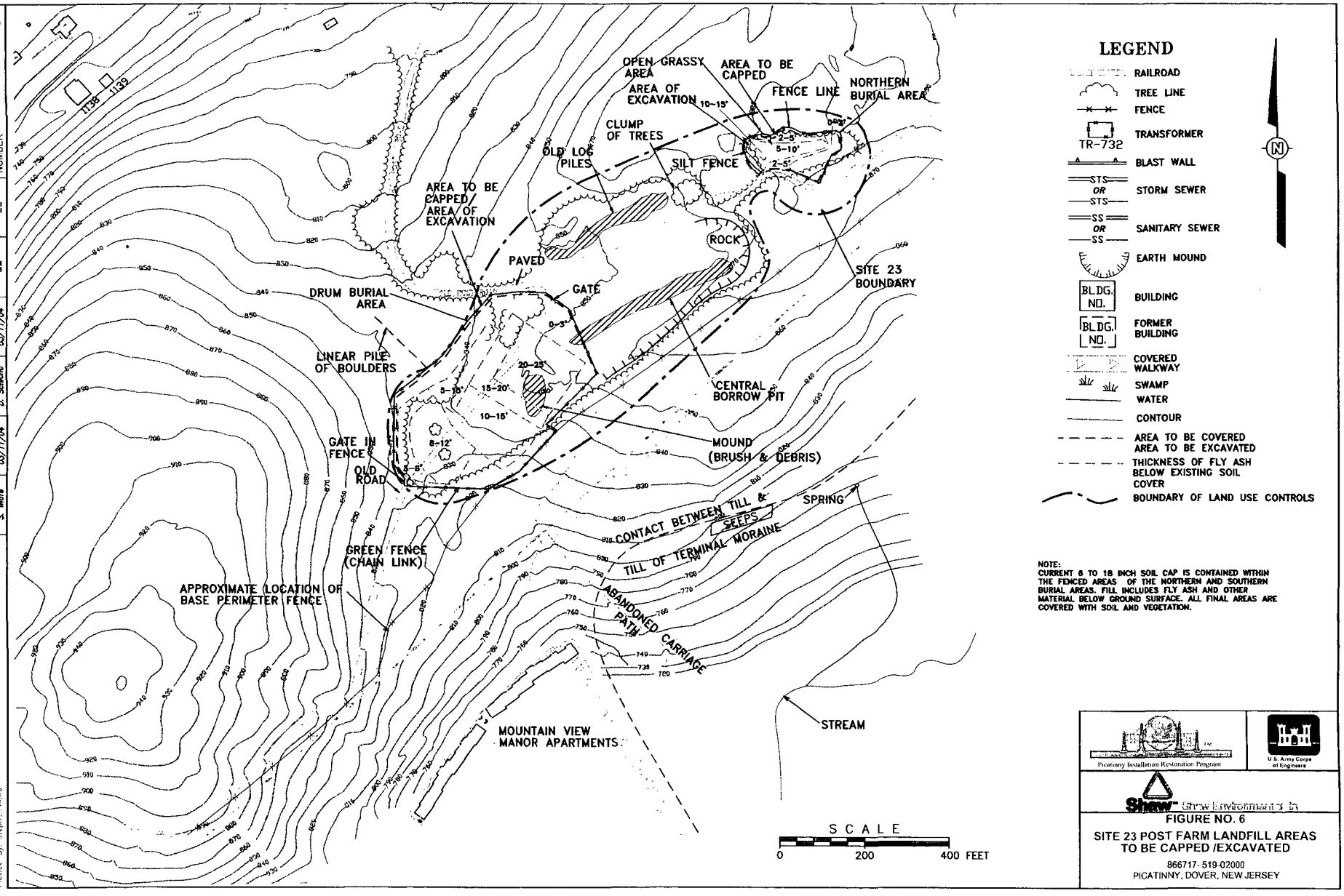
An exit strategy is a plan for the completion of a long-term monitoring program. There are two primary goals associated with an exit strategy. The first is to verify that the site conditions do not deteriorate to an unacceptable state. The second goal is to determine when groundwater contaminant levels have decreased to a level where monitoring can be stopped. To accomplish this, the exit strategy must specify how much contamination is acceptable to stop the monitoring and also how much contamination is too high. If the monitoring program determines that there is too much contamination, additional cleanup must be started. Exit strategies often include institutional controls to ensure compliance with pre-determined objectives such as periodic groundwater monitoring, site access restrictions, and permit requirements.

In the event groundwater monitoring for an analyte group is to be reduced in frequency or terminated, the USEPA and NJDEP will be notified and approval received prior to any change.

The current soil cover will be inspected for erosional damage. Any repair necessary consistent with the land use will be performed. Records of these inspections/repairs will be maintained by the Army.

Since some contamination would remain on site, land use restrictions would be required as part of this alternative. LUCs are administrative measures put in place to restrict human activity in order to preclude undesirable land use. In the case of the Post Farm Landfill, LUCs will be established to preclude activities that could lead to unacceptable human exposure to environmental contaminants. The specific plan for implementing LUCs for this site will be submitted as part of the RD after the ROD has been signed. The LUCs developed in the RD will contain sufficient detail such that adherence to the RD will ensure the protectiveness of the remedy.

The Army is responsible for implementing, maintaining, reporting on, and enforcing the land use controls. Land use controls will be maintained until the concentration of hazardous substances in the soil and groundwater are at such levels to allow for unrestricted use and exposure. A LUC Remedial Design


LEGEND
RAILROAD
TREE LINE
FENCE
TRANSFORMER
TR-732
BLAST WALL
STS
OR
STS
STORM SEWER
SS
OR
SS
SANITARY SEWER
EARTH MOUND
BL.DG. NO.
BUILDING
BL.DG. NO.
FORMER BUILDING
COVERED WALKWAY
SWAMP
WATER
CONTOUR
AREA TO BE COVERED
AREA TO BE EXCAVATED
THICKNESS OF FLY ASH BELOW EXISTING SOIL COVER
BOUNDARY OF LAND USE CONTROLS
NOTE:
CURRENT 6 TO 18 INCH SOIL CAP IS CONTAINED WITHIN THE FENCED AREAS OF THE NORTHERN AND SOUTHERN BURIAL AREAS. FILL INCLUDES FLY ASH AND OTHER MATERIAL BELOW GROUND SURFACE. ALL FINAL AREAS ARE COVERED WITH SOIL AND VEGETATION.
OPEN GRASSY AREA
AREA TO BE CAPPED
AREA OF EXCAVATION
FENCE LINE
NORTHERN BURIAL AREA
CLUMP OF TREES
OLD LOG PILES
SILT FENCE
AREA TO BE CAPPED/ AREA OF EXCAVATION
ROCK
PAVED
SITE 23 BOUNDARY
DRUM BURIAL AREA
GATE
LINEAR PILE OF BOULDERS
CENTRAL BORROW PIT
GATE IN FENCE
OLD ROAD
MOUND (BRUSH & DEBRIS)
SPRING
SEEPS
CONTACT BETWEEN TILL & TILL OF TERMINAL MORAINE
GREEN FENCE (CHAIN LINK)
APPROXIMATE LOCATION OF BASE PERIMETER FENCE
ABANDONED CARRIAGE PATH
STREAM
MOUNTAIN VIEW MANOR APARTMENTS
SCALE
0
200
400 FEET
DRAWN BY S. Wirfs 03/11/04
CHECKED BY D. Sciscio 03/11/04
APPROVED BY -- --
DRAWING NUMBER 23PF031104.dwg
Picatinny Installation Restoration Program
U.S. Army Corps of Engineers
Shaw Environmental, Inc.
FIGURE NO. 6
SITE 23 POST FARM LANDFILL AREAS TO BE CAPPED /EXCAVATED
866717-519-02000
PICATINNY, DOVER, NEW JERSEY

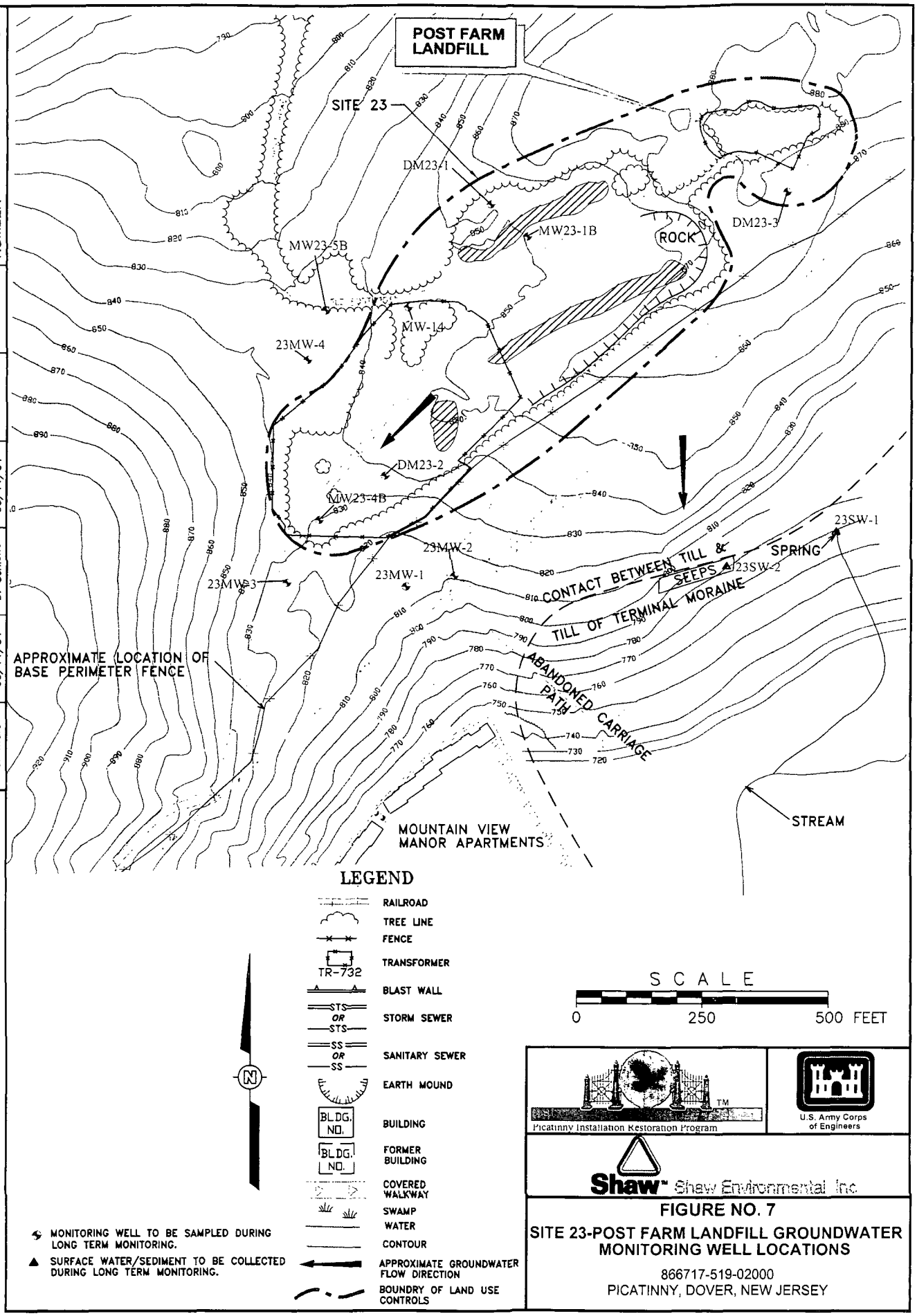


FIGURE NO. 7

SITE 23-POST FARM LANDFILL GROUNDWATER MONITORING WELL LOCATIONS

866717-519-02000
PICATINNY, DOVER, NEW JERSEY

XREF Files: IMAGE Files: ace.gif picatinny\Area-C\site23\23PF031104.dwg
File: N:\cad\CAD drawings\Picatinny\Area-C\site23\23PF031104.dwg
Plot Date/Time: Aug 18, 2004 - 1:02pm
Plotted By: stephen.waite

will be prepared as the land use component of the Remedial Design. Within 90 days of ROD signature, the Army shall prepare and submit to EPA for review and approval a LUC remedial design that shall contain implementation and maintenance actions, including periodic inspections.

Industrial land use and intermittent recreational land use (i.e., hunting) of the Post Farm Landfill are acceptable. This remedy prohibits any land use that could result in prolonged exposure to the site. Any activity that would degrade the integrity of the soil cover is also prohibited. The following land use control objectives will be met by implementation of LUCs:

- Prevent access or use of the groundwater until cleanup levels are met.
- Maintain the integrity of any current or future remedial or monitoring system such as monitoring wells..
- Maintain the soil covers at the Drum Burial Area and the Northern Burial Area.
- Requirements of NJDEP Deed Restriction policies will be included in the LUC RD. Many of the exhibits required (maps, engineering drawings, location maps) are already incorporated into the Army's plans.

The LUC objectives listed above will be met through the implementation of LUCs as part of all remedial alternatives. In the interest of steamlining this text, these details will not be repeated in the discussion of each alternative.

2.9.3 Alternative 4: Excavation and Off-Post Disposal of Fly Ash, Implementation of LUCs, and Groundwater Monitoring

Estimated Capital Cost: $ 3,288,860

Estimated O&M Cost: $ 184,117

Present Worth: $ 3,472,977

(Present worth O&M/Replacement 30 years, calculated using a 7% discount rate)

Alternative 4 involves the excavation and off-post disposal of fly ash, and groundwater monitoring. Fly ash from both the DBA and the northern area would be excavated. The proposed excavation areas are presented on **Figure 6**.

Based on the results of previous investigations, the volume of fly ash is approximately 58,000 cy in the DBA and approximately 2,000 cy in the NBA.

The fly ash would be excavated using standard equipment, such as tracked excavators, dump trucks, etc., and earthmoving techniques. Prior to excavation, the necessary erosion and sedimentation controls would be installed. Dust control measures (i.e., water sprays) will be implemented throughout the excavation activities, as necessary. The extent of fly ash removal will be based on visual observations. Fly ash will be removed until undisturbed soil is encountered. Once the fly ash has been removed, the excavations will be graded for slope stability. Six inches of a vegetative layer will be placed on the excavated areas. The estimated 60,000 cy of fly ash would be transported for off-post disposal in a permitted landfill. This fly ash would be classified as non-hazardous waste. The assumed mode of shipment is tri-axle dump trucks or trailers. Prior to landfill acceptance, additional analyses may be required to confirm that the fly ash is acceptable for disposal at the selected facility.

The existing groundwater monitoring wells would be used to conduct long-term groundwater monitoring as part of this alternative. Samples would initially be collected to monitor the concentrations of contaminants in the site wells and to ensure that COCs in groundwater do not migrate from the site at concentrations that would be harmful to human health or the environment. Additionally, the off-post spring and seep will be sampled as part of the groundwater-monitoring program. Well locations are presented on **Figure 7**. This monitoring program will be modified and/or abandoned based upon the site-specific exit strategy.

In the event groundwater monitoring for an analyte group is to be reduced in frequency or terminated, the USEPA and NJDEP will be notified and approval received prior to any change.

Since some contamination would remain on site, land use restrictions would be required as part of this alternative. LUCs are administrative measures put in place to restrict human activity in order to preclude undesirable land use. In the case of the Post Farm Landfill, LUCs will be established to preclude activities that could lead to unacceptable human exposure to environmental contaminants. The specific plan for implementing LUCs for this site will be submitted as part of the RD after the ROD has been signed. The LUCs developed in the RD will contain sufficient detail such that adherence to the RD will ensure the protectiveness of the remedy.

2.9.4 Alternative 5: Groundwater Monitoring and Implementation of LUCs

Estimated Capital Cost: $ 18,850

Estimated O&M Cost: $ 184,117

Present Worth: $ 202,967

(Present worth O&M/Replacement 30 years, calculated using a 7% discount rate)

This alternative would consist of long-term groundwater monitoring, using the existing groundwater monitoring wells and continued funding and implementation of LUCs. No actions would be taken to address the fly ash present at the site. As was the case with the other action alternatives, samples would be collected to monitor the concentrations of contaminants in the site wells. Sample results will be used to ensure COCs in groundwater do not migrate from the site at concentrations that would be harmful to human health or the environment. Additionally, the off-post spring and seep will be sampled as part of the groundwater-monitoring program. Well locations are presented on **Figure 7**.

In the event groundwater monitoring for an analyte group is to be reduced in frequency or terminated, USEPA and NJDEP will be notified and approval received prior to any change.

Also as part of this alternative, one round of surface soil samples will be collected surrounding former scattered LOC exceedances. Four surface soil samples will be collected, 25 ft in each direction, from the following six previous sampling locations: SS23-1A, MW23-5A, 23SB-9, 23SB-7, 23SB-3, and 23SB-1.

Since some contamination would remain on site, land use restrictions would be required as part of this alternative. LUCs are administrative measures put in place to restrict human activity in order to preclude undesirable land use. In the case of the Post Farm Landfill, LUCs will be established to preclude activities that could lead to human exposure to environmental contaminants. The specific plan for implementing LUCs for this site will be submitted as part of the RD after the ROD has been signed. The LUCs developed in the RD will contain sufficient detail such that adherence to the RD will ensure the protectiveness of the remedy.

2.10 COMPARITIVE ANALYSIS OF REMEDIAL ALTERNATIVES

The Army and USEPA selected the preferred alternatives by evaluating each of the alternatives against the nine criteria established by the USEPA. These criteria are described in the subsections below.

The advantages and disadvantages of each of the alternatives were compared using the nine CERCLA evaluation criteria established by the USEPA in Section 300.430(e) of the NCP. The detailed comparative analysis of all the alternatives is provided in the FFS: a summary of this comparison is provided in the following text.

The following discussion provides a synopsis of the detailed evaluation of the remedial alternatives presented in the FS for Site 23 (IT, 2001).

2.10.1 Threshold Criteria (must be met)

2.10.1.1 Overall Protection of Human Health and the Environment

Addresses whether each alternative provides adequate protection of human health and the environment by eliminating, reducing, or controlling exposure to human or environmental receptors

Alternative 1 does not include any additional actions that would satisfy the intent of the evaluation criteria, as discussed in the following sections. However, the existing security gate, access restrictions, and current land use restrictions serve to limit access to the site, thereby reducing the potential for human exposure to the fly ash and contaminated soil.

Alternative 2 would be protective of human health because it would limit the potential for direct contact exposure to, and inhalation and ingestion of, the fly ash and contaminated soil. However, the degree of long-term protection afforded by this alternative would be dependent upon the proper maintenance of the vegetated soil cover, as well as the enforcement of the land-use and access restrictions. Remedial Alternative 2 would also be protective of the environment (groundwater, surface water, and air), because it would prevent the migration of the fly ash via wind dispersion and erosion. Groundwater monitoring would allow for an ongoing evaluation of the groundwater quality at the site. If this evaluation shows that contaminant concentrations are increasing to levels that pose a risk to human health or that contaminants are migrating off site, the need for performance of subsequent remedial actions can be evaluated in accordance with the exit strategy.

Alternative 4 would be the most protective of human health and the environment because the fly ash materials would be permanently removed from the site and disposed of off site in a properly permitted secure landfill. This alternative would prevent the spread of the fly ash via wind dispersion and erosion, and would eliminate the possibility of degradation of subsurface soils, groundwater, and surface water. Groundwater monitoring would allow for an ongoing evaluation of the groundwater quality at the site. If this evaluation shows that contaminant concentrations are increasing to levels that pose a risk to human health or that contaminants are migrating off site, the need for performance of subsequent remedial actions can be evaluated in accordance with the exit strategy.

Under Alternative 5, the existing soil cover over the site would continue to prevent exposure of humans to the fly ash, therefore, this alternative is more protective of human health than Alternative 1. Groundwater monitoring proposed by this alternative would allow for an ongoing evaluation of the groundwater quality at the site. If this evaluation shows that contaminant concentrations are increasing to levels that pose a risk to human health or that contaminants are migrating off site, the need for performance of subsequent remedial actions can be evaluated in accordance with the exit strategy.

2.10.1.2 Compliance with ARARs

Addresses if a remedy would meet all of the ARARs related to the hazardous substances at the site and the circumstances of their release. ARARs are Federal and State laws and promulgated regulations identified for Site 23 remediation at Picatinny.

Alternative 1 would not satisfy any of the location-specific ARARs or the chemical-specific ARARs for groundwater (there are no chemical-specific ARARs for soils). Action-specific ARARs would not apply to this remedial alternative because no additional actions would be taken at the site.

There are no chemical-specific ARARs for soils. NJDEP NRDCSCC were utilized as information to be considered for Site 23. Alternatives 2, 4, and 5 would meet the remedial action objective, which is to prevent exposure to the fly ash materials. Compliance with the location- and action-specific ARARs would be required and considered during the design phase for Alternatives 2, 4, and 5. Alternatives 2, 4, and 5 would not include any active measures to meet the chemical-specific ARARs for groundwater at this site; although, a determination would be made as to when (or if) contaminant levels in the groundwater at the site meet or exceed the ARARs. Over the long term, natural processes (i.e., adsorption, biodegradation, dispersion, dilution, chemical or biological stabilization, and chemical destruction) will likely reduce contamination concentrations in groundwater. Therefore, Alternatives 2, 4, and 5 would likely comply with ARARs over the long term.

2.10.2 Primary Balancing Criteria (Identifies major trade-offs among alternatives)

2.10.2.1 Long-term Effectiveness and Permanence

Addresses the remaining risk and the ability to protect human health and the environment over time.

Alternative 1, No Action, does not satisfy the long-term effectiveness and permanence criteria because the remedial action objectives would not be achieved.

Alternative 2, Vegetated Soil Cover with Groundwater Monitoring, would achieve the remedial action objectives and would be effective in reducing the long-term risks associated with the site. However, the permanence of this remedial alternative would be entirely dependent upon the proper construction and effective long-term maintenance of the soil cover and the proper enforcement of land-use and access restrictions. Groundwater monitoring would be an effective means by which to monitor the groundwater quality at the site over the long term. Monitoring would allow a determination to be made as to whether unacceptable levels of contaminants are migrating off site, in accordance with the exit strategy.

Alternative 4, Excavation and Off-Post Disposal, would be the most effective and permanent remedy. Excavation and Off-Post landfilling of fly ash materials would eliminate the potential for exposure to the fly ash materials because they would be permanently removed from the site and secured in a permitted disposal facility. Groundwater monitoring would be an effective means by which to monitor the groundwater quality at the site over the long term. Monitoring would allow a determination to be made as to whether unacceptable levels of contaminants are migrating off site, in accordance with the exit strategy.

Under Alternative 5, the existing soil cover at Site 23 would prevent exposure of humans to fly ash. Groundwater monitoring would be an effective means by which to monitor the groundwater quality at the site over the long term. Monitoring would allow a determination to be made as to whether unacceptable levels of contaminants are migrating off site, in accordance with the exit strategy.

2.10.2.2 Reduction in Toxicity, Mobility or Volume through Treatment

Addresses the anticipated performance of treatment that permanently and significantly reduces toxicity mobility or volume of hazardous substances as a principle threat at the site.

Alternative 1, No Action, would not actively reduce the toxicity, mobility, or volume of the fly ash materials or the contaminants in the site groundwater. Natural attenuation processes (i.e., adsorption, biodegradation, dispersion, dilution, chemical or biological stabilization, and chemical destruction) may reduce contaminant concentrations in groundwater over the long term.

Alternative 2, Vegetated Soil Cover with Groundwater Monitoring, would not reduce the toxicity or volume of the fly ash, but would effectively reduce its mobility through containment. Improvement of the vegetated soil cover over the fly ash would prevent its migration due to wind dispersion and surface runoff, and would help to reduce migration of the contaminants to groundwater. This alternative would not reduce the toxicity, mobility, or volume of the contaminants in the site groundwater. However, natural attenuation processes (i.e., adsorption, biodegradation, dispersion, dilution, chemical or biological stabilization, and chemical destruction) may reduce contaminant concentrations in groundwater over the long term.

Alternative 4, Excavation and Off-Post Disposal with Groundwater Monitoring, would reduce the mobility of the fly ash materials because they would be excavated and disposed of in a secure off-post landfill equipped with a liner, leachate collection system, and a cap upon closure. This alternative would not reduce the toxicity, mobility, or volume of the contaminants in the site groundwater. However, natural attenuation processes (i.e., adsorption, biodegradation, dispersion, dilution, chemical or biological stabilization, and chemical destruction) may reduce contaminant concentrations in groundwater over the long term.

Alternative 5, Groundwater Monitoring, documents the mobility of the groundwater with chemical constituent concentrations above ARARs by monitoring downgradient locations. Remedial action can be planned if contaminant migration occurs to an unacceptable level. However, natural attenuation

processes (i.e., adsorption, biodegradation, dispersion, dilution, chemical or biological stabilization, and chemical destruction) may reduce contaminant concentrations in groundwater over the long term. The existing soil cover would not reduce the toxicity or volume of the fly ash, but would effectively reduce its mobility through containment. The existing soil cover over the fly ash would prevent its migration due to wind dispersion and surface runoff, and would help to reduce migration of the contaminants to groundwater.

2.10.2.3 Short-term Effectiveness

Addresses the impacts to the community and site workers during cleanup including the amount of time it takes to complete the action. Addresses the impacts to the community during the off-site disposal, including transportation of the waste and impacts in the area of the disposal facility.

Alternative 1, No Action, does not include any additional actions that would serve to address the fly ash material or the contamination in site groundwater. Therefore, there would be no short-term impacts resulting from its implementation.

Alternative 2, Vegetated Soil Cover, would not produce significant short-term impacts on workers, the surrounding community, or the environment. This alternative would result in some dust generation, but risks would be controlled through the use of suitable protective equipment by site workers, good construction practice, real-time air monitoring, and standard dust suppression techniques (i.e., water sprays). Groundwater Monitoring can be implemented without producing significant impacts on workers, the surrounding community, or the environment. Risks to site workers would be controlled through the use of suitable protective clothing and air monitoring during sampling activities.

Alternative 4, Excavation and Off-Post Disposal, would produce risks that would be acceptable, however, the risks would be greater than those of Alternative 2. This is because implementation of Alternative 4 would require the excavation, handling, and management of the fly ash, whereas Alternative 2 would not. Alternative 4 would require that materials be excavated and loaded onto appropriate hauling vehicles for transportation on public roadways to the appropriate disposal facility. As was the case with Alternative 2, risks to site workers and the surrounding community could be controlled through the use of suitable protective clothing, good construction practice, real-time air monitoring, and standard dust suppression techniques. The additional risks associated with the transportation of the fly ash materials on public roadways would include the potential for highway accidents involving hauling vehicles and spills of fly ash materials. The risks associated with waste transportation would be minimized by following the appropriate Department of Transportation, State, and local shipping requirements for all transportation-related activities. Groundwater monitoring can be implemented without producing significant impacts on workers, the surrounding community, or the environment. Risks to site workers would be controlled through the use of suitable protective clothing and air monitoring during sampling activities.

Alternative 5, Groundwater Monitoring, can be implemented without producing significant impacts on workers, the surrounding community, or the environment. Risks to site workers would be controlled through the use of suitable protective clothing and air monitoring during sampling activities.

2.10.2.4 Implementability

Addresses the technical and administrative feasibility of an alternative, including the availability of materials and services required for cleanup.

Since the No Action Alternative does not include any additional activities to address the fly ash or contaminants in the site groundwater, there are no technical or administrative implementability issues.

Each of the three action alternatives (Vegetated Soil Cover, Excavation and Off-Post Disposal, and Groundwater Monitoring) can be readily implemented. The required equipment, services, and materials are readily available, as are the required Off-Post disposal facilities.

2.10.2.5 Cost

Compares the differences in cost, including capital, operation, and maintenance costs.

Present worth (discount rate of 7%) for each alternative is presented. With the exception of Alternative 1, Alternative 5 results in the lowest costs.

Alternative 1: $ 0.00

There are no costs associated with this alternative.

Alternative 2:

Estimated Capital Cost: $ 481,397

Present Worth: $ 801,238

Alternative 4:

Estimated Capital Cost: $ 3,288,860

Present Worth: $ 3,472,977

Alternative 5:

Estimated Capital Cost: $ 18,850

Present Worth: $ 202,967

2.10.3 Modifying Criteria (formally evaluated after the public comment period)

2.10.3.1 State Acceptance

Evaluates whether the State agrees with, opposes or has no comment ton the preferred alternatives. This criterion is formally evaluated when the comments to the proposed plan are reviewed.

NJDEP acknowledges that Alternative 5 (Groundwater Monitoring and Implementation of LUCs) complies fully with New Jersey State Law. Based on this, it is anticipated that NJDEP will approve the selection of Alternative 5.

2.10.3.2 Community Acceptance

Addresses the issues and concerns the public may have regarding each of the alternatives. This criterion is evaluated formally when comments on the proposed plan are reviewed. Community acceptance of the preferred alternative will be evaluated by comments received during the open comment period as well as feedback received by the restoration advisory Board. Community acceptance is addressed in the **Responsiveness Summary** of this ROD.

2.11 SELECTED REMEDY

This ROD represents the Selected Remedy for Site 23 at Picatinny, in Rockaway Township, New Jersey, developed in accordance with CERCLA as amended and consistent with the NCP. This decision is based on the administrative record for the site. The Selected Remedy for this site is Alternative 5: Groundwater Monitoring and Implementation of LUCs. A detailed description of the preferred remedial action is provided in this section.

The total project estimated capital cost, if approved, is $ 202,967, the sum total of which will be paid by the United States Army for the Department of Defense.

Alternative 5 is the preferred alternative for Site 23 because it provides the best balance between the assessed criteria while still providing overall protection of human health.

2.11.1 Summary of the Rationale for the Selected Remedy

Alternative 5, Groundwater Monitoring and Implementation of LUCs, represents the best balance of the nine evaluation criteria considered in **Section 2.10**. With the exception of Alternative 1 (No Action), each of the alternatives analyzed in detail would meet the remedial action objectives. However, the total cost of implementing Alternative 5 (long-term groundwater monitoring, and land-use restrictions) is significantly lower than that of Alternatives 2 and 4.

The protectiveness of Alternative 5 is based on a combination of new actions that will take place and previous remedial actions that have already occurred. New actions that will occur as part of the implementation of Alternative 5 include long term groundwater monitoring, periodic site inspections, establishment of new land use/institutional controls, implementation of LUCs as specified in the RD,

repair of site fencing and soil covers as needed. The protectiveness of the remedy will be reviewed as part of annual inspections and the performance of five-year reviews. A significant portion of the protectiveness of Alternative 5 is derived from older actions that the Army has already completed. These older actions include the existing fences around the NBA and DBA and the existing soil cover installed over ten years ago.

The existing soil cover at Site 23 is expected to prevent exposure of humans to fly ash. Although Alternative 5 does not involve active measures to address groundwater contamination at the present time and in future scenarios, groundwater contamination does not appear to be leaving Picatinny boundaries and no complete pathway exists. Therefore, long-term monitoring is appropriate and Alternative 5 would likely comply with the groundwater ARARs over the long term. Alternative 5 can be readily implemented and does not present any short-term risks to the surrounding community, environment, or site workers. Therefore, Alternative 5 is recommended as the preferred alternative for Site 23.

Land use and access restrictions, which are an integral part of this preferred alternative, will be administered and implemented according to the specific LUCs included as part of the RD. The RD will be submitted after the ROD has been signed. The purpose of the LUCs specified in the RD will be to assure that institutional controls will be maintained and implemented at Site 23 in a manner that ensures the protectiveness of the remedy.

Based on information currently available, the lead agency believes the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Army expects the selected remedy to satisfy the following statutory requirements of CERCLA § 121(b): 1) be protective of human health and the environment; 2) comply with ARARs; and, 3) be cost effective.

2.11.2 Detailed Description of the Selected Remedy

Alternative 5, the selected remedy, would consist of groundwater monitoring, monitoring of surface water and sediment samples from the off-post spring and seep, and implementation of LUCs to prevent exposure to the fly ash. The groundwater monitoring program to be conducted as part of this alternative would consist of collecting and analyzing groundwater samples from the existing groundwater monitoring wells at the site. The objective of the groundwater monitoring program is to ensure site conditions remain protective and levels of COCs in site groundwater do not migrate off-site. Initially groundwater samples will be collected from eleven monitoring wells. The number of wells sampled will be reduced over time and eventually groundwater monitoring will cease in accordance with an exit strategy to be included in the remedial design. **Figure 7** presents the location of the wells. This ongoing program would allow for the continued evaluation of groundwater quality at the site. One round of surface soils samples is also included in this alternative. This round of soil samples will be collected to ensure isolated areas of contamination are not more widespread. If unexpected levels of contamination are found in the surface soil samples additional topsoil may be placed at the site.

This Alternative would include the following major elements:

2.11.2.1 Work Plan Preparation

This would include a site-specific work plan describing the sampling procedures, a quality assurance/control plan, sampling plan, and a site health and safety plan.

2.11.2.2 Contractor and Material Procurement

This would include preparation of bid packages for the laboratory, solicitation of bids, bid review, and laboratory selection.

2.11.2.3 Mobilization

The personnel and equipment to complete the work would be mobilized to the site.

2.11.2.4 Sampling

This includes collection of groundwater samples from the existing site wells as described above. Samples would be shipped to the selected laboratory for analysis on a standard turnaround time basis.

2.11.2.5 Disposal of Work-Related Residuals

This includes off-post disposal of personal protective equipment and other waste items generated during the sampling activities.

2.11.2.6 Land Use Controls

Land use controls will continue to be implemented for Site 23 to prevent human exposure to contaminated soil and to protect the vegetated soil cover. Elements of institutional controls at the Picatinny including specific LUC implementation descriptions will be included as part of the RD. The land use control objectives are the following:

- Ensure site conditions remain protective such that levels of COCs in site groundwater do not impact human receptors.
- Ensure site conditions remain protective such that levels of COCs in site groundwater does not migrate off site.
- Ensure site conditions remain protective such that human receptors do not contact fly ash buried at the site
- Requirements of NJDEP Deed Restriction policies will be included in the LUC RD. Many of the exhibits required (maps, engineering drawings, location maps) are already incorporated into the Army's plans.

2.11.3 Summary of the Estimated Costs for the Selected Remedy

The costs associated with the preferred alternative for Site 23 are summarized as outlined in the following list:

CAPITAL COSTS

➢ **Institutional Actions**	**$13,000**
• Access Restrictions	$2,000
• Land Use Permits and Report Writing	$11,000
➢ **Contingency (15%)**	**$1,950**
➢ **Legal (10%)**	**$1,300**
➢ **Engineering and Design (20%)**	**$2,600**
TOTAL CAPITAL COSTS	**$18,850**

O&M COSTS

➢ **Groundwater Monitoring**[†]	**$184,117**
TOTAL PRESENT WORTH O&M COSTS (7% DIS.)	**$184,117**
TOTAL PRESENT WORTH	**$202,967**

The costing information in this section is based on the best available information regarding the anticipated scope of the remedial alternative. Details on the above cost items are presented in Appendix C of the Final FS for Site 23. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences, or a ROD amendment.

[†] Present worth through 30 years

2.11.4 Expected Outcomes of the Selected Remedy

It is anticipated that implementation of the selected remedy will ensure compliance with groundwater chemical-specific ARARs over the long term. The existing soil cover and implementation of LUCs will prevent human exposure to fly ash buried at Site 23.

2.12 STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment and permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

2.12.1 Protection of Human Health and the Environment

The existing soil cover over the site would continue to prevent exposure of humans to the fly ash. Groundwater monitoring proposed under this alternative would allow for an ongoing evaluation of the groundwater quality at the site. If this evaluation shows that contaminant concentrations are increasing to levels that pose a risk to human health or that contaminants are migrating off site, the need for performance of subsequent remedial actions can be evaluated in accordance with the exit strategy.

2.12.2 Compliance with ARARs

2.12.2.1 Chemical Specific ARARs

Two jurisdictions, federal and state, can enact laws to protect human health and the environment. Localities (such as municipal governments) do not enact laws but usually govern by ordinances. The same holds true for facilities. CERCLA 121(d)(2)(A)(ii) discusses the consideration of environmental law or facility siting law, however, both are in the context of state laws which are more stringent. CERCLA, the mechanism under which remediation at this site is conducted, defines the role and importance of federal and state laws. Section 121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with requirements or standards under federal or more stringent state environmental laws that are applicable or relevant and appropriate to hazardous substances or particular circumstances at the site.

Surface Water

Because no VOCs or metals were detected at concentrations greater than LOCs for this site no COPCs were selected. Therefore, ARARs and TBCs have not been identified for surface water.

Surface and Subsurface Soils ARARs

Neither the federal government nor the State of New Jersey has promulgated chemical-specific standards, requirements, criteria, and/or limitations that are applicable or relevant and appropriate for remediation of Site 23 surface and subsurface soils. NJDEP has published the NRDCSCC. These criteria were utilized as TBC values and in accordance with the August 5, 1999 letter from Brigadier General John P. Geis to NJDEP Chief Mr. Bruce Venner, these values were used in the remedy selection process.

Federal and State Surface Soil TBCs

TBC guidance includes advisories that have not been promulgated and thus are not enforceable. When compiling chemical-specific criteria TBCs are useful where ARARs do not exist for a specific chemical, or where such ARARs are not sufficient to be protective. The use of TBC guidance will not be necessary at Site 23 because the results of the human health risk assessment conducted for the site did not indicate unacceptable risk. Surface soil samples were collected and the generated data was used in a HHRA. The calculated risk was below 1×10^{-6} and an HI of 1. According to CERCLA, this level of risk does not necessitate a remedial action. Therefore, there is no remedial action required as a result of risk and no promulgated clean-up levels. No additional guidance in the form of TBCs is needed.

This alternative would not include any actions to address the fly ash at the site. However, the existing soil cover is expected to prevent exposure of humans to fly ash.

Sediment

Neither the federal government nor the state of New Jersey has promulgated standards, requirements, criteria, and/or limitations that are applicable or relevant and appropriate for Site 23 sediment.

Groundwater Criteria

Chemical-specific ARARs for groundwater are highly dependent upon the use or potential use of the groundwater as a resource. Specifically, the USEPA goal at CERLCA sites is to return groundwater to its beneficial use within a reasonable period of time (USEPA, 1988). Both the state and federal governments recognize the groundwater underlying Site 23 as being Class IIA groundwater. The primary designated use of Class IIA groundwater is potable water and/or conversion of this groundwater through conventional water supply treatment, mixing, or other similar techniques to potable water to the extent that these uses are viable [N.J.A.C. 7:9-6.5(c)]. Class IIA secondary uses includes agricultural water and industrial water.

Two jurisdictions, federal and state, can enact laws to protect human health and the environment. Section 121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with requirements or standards under federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances or particular circumstances at the site.

The federal and state governments have promulgated standards, requirements, criteria, and/or limitations that are applicable or relevant and appropriate for groundwater at Site 23. Federal ARARs have been promulgated in the Safe Drinking Water Act (SDWA) while the state ARARs have been promulgated in the New Jersey Safe Drinking Water Act and the New Jersey Groundwater Quality Standards.

Federal Groundwater ARARs

The federal SDWA contains several lists of criteria including MCLs and MCLGs. MCLs are enforceable standards that take into consideration human health effects, available treatment technologies, and costs of treatment. Generally, MCLGs are health-based criteria that are lower than the corresponding constituent's MCL criteria. However, because the technical feasibility or cost of remediating to the MCLG is impracticable, a technology based MCL was adopted.

Pursuant to SDWA, MCLs are applicable "at the tap" for public water systems that have at least fifteen service connections or that serve an average of at least twenty-five people daily for at least sixty days a year.

State Groundwater ARARs

New Jersey has incorporated by reference the federal MCLs [N.J.A.C. 7:10-5.1]. The New Jersey MCLs apply to public water systems and are identical to the SDWA MCLs except for more stringent MCLs for VOCs [N.J.A.C. 7:10-5.2(a)(4).]. Like the federal MCLs, New Jersey MCLs are relevant and appropriate for a Class IIA water source. Therefore, New Jersey MCLs are considered ARARs for this FS.

Additionally, the state has also promulgated Groundwater Quality Standards (GWQS) [N.J.A.C. 7:9-6]. The purpose of GWQS is to protect groundwater quality through the establishment of constituent standards [N.J.A.C. 7:9-6.1(b)]. GWQS consist of two lists of criteria. The first list, referred to within this FS as "quality criteria", is generally composed of contaminant concentrations that are protective of human health and the environment. The second list is composed of individual contaminant's practical quantitation limit (PQL). New Jersey PQLs are the lowest levels of a specified substance that can be reliably measured within specified limits of precision and accuracy during routine laboratory operations. Chemical specific ARARs for Site 23 groundwater are presented in **Table 2-5**.

The selected remedy would not include any active measures to meet the chemical-specific ARARs for groundwater at this site; although, it will allow a determination to be made as to when (or if)

contaminant levels in the groundwater at the site meet or exceed the ARARs. Over the long term, natural processes (i.e., adsorption, biodegradation, dispersion, dilution, chemical or biological stabilization, and chemical destruction) will likely reduce contamination concentrations in groundwater. Therefore, this alternative would likely comply with chemical-specific ARARs over the long term.

2.12.2.2 Location Specific ARARs

Remedial action alternatives may be restricted or precluded by federal, state, and U.S. Army regulations based on its location within a site or its immediate environment. Location-specific ARARs are designed to protect the local area from potentially damaging remedial actions. For example, altering habitat of an endangered species to construct a treatment facility may jeopardize the survivability of the species. The converse is also true; location-specific ARARs also protect remedial alternatives from the environment. For example, locating a treatment facility within a flood plain without proper engineering precautions may result in structural damage during a flood.

Table 2-5

Chemical Specific ARARs for Site 23 Groundwater

Authority	Laws/Regulations	Requirement(s)	Status
Federal Regulatory Requirements	Safe Drinking Water Act (SDWA) - Maximum Contaminant Levels (MCLs), 40 C.F.R. 141.11-141.13, 141.61 and 141.62	MCLs have been promulgated and regulate contaminants in public drinking water.	ARAR
	SDWA – Maximum Contaminant Level Goals (MCLGs)	Health-based criteria for drinking water sources.	ARAR
State Regulatory Requirements	Safe Drinking Water Act - State MCLs, N.J.A.C. 7:10-1 et. seq.	MCLs have been promulgated by the state and regulate contaminants in public drinking water.	ARAR
	Groundwater Quality Standards, N.J.A.C. 7:9-6.1 et. Seq.	Contaminated groundwater may have to be remediated.	ARAR

Table 2-6 identifies the federal, state, and U. S. Army regulations that contain promulgated standards, requirements, criteria, or limitations that will be considered ARARs for this FS. The selected remedial alternative will comply with the location specific ARARs identified.

2.12.2.3 Action Specific ARARs

Action-specific ARARs are promulgated state or federal laws that set controls or restrictions on activities related to the management of hazardous materials. The selected remedial alternative will require several "actions" to transpire in the course of successfully instituting the alternative and may be controlled or restricted by action-specific ARARs. The action-specific ARARs and TBCs are organized by the associated actions and presented in **Table 2-7**. The selected remedial alternative will comply with the action-specific ARARs identified.

2.12.3 Cost Effectiveness

In the lead agency's judgment, the Selected Remedy is cost-effective and represents a reasonable value in the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those

TABLE 2-6
Location-Specific ARARs for Site 23

Location	Law/Regulation	Requirement of Law/Regulation	ARAR Status
Endangered Species Act (Rare, Threatened, or Endangered Species)	Presence of those species listed in the following acts and regulations: - Endangered Species Act (16 U.S.C. 1531 *et seq*) - Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*) - 40 CFR 6.302(h) - 50 CFR 402 - CWA § 404 - 50 CFR 17.11 and 17.12 - NJAC 7:25-4 as being rare, threatened, or endangered species.	Whenever possible, federal agency actions must avoid or minimize adverse impacts on rare, threatened, or endangered species and act to preserve and enhance their natural and beneficial values. Agencies should particularly avoid new construction in those areas containing these species unless there are no practicable alternatives. Federal agencies shall incorporate rare, threatened, or endangered species protection consideration into planning, regulating, and decision-making processes.	ARAR. Applicable since clearing, grubbing and/or excavation activities could impact habitat typical of several sensitive species listed within the Endangered Species Act. Protected species which are resident at Picatinny Arsenal are the barred owl, blue heron, bog turtle, wood turtle, Indiana bat, timber rattlesnake, and brook trout.
U.S. Army Sites	Army Regulations for Environmental Protection and Enhancement (AR 200-1)	These regulations are the primary Army environmental policy. A more detailed guidance on compliance with environmental laws and regulations is found in the accompanying draft final technical document DA PAM 200-1.	ARAR. Applicable for site removal activities. All hazardous materials will be disposed of through the Environmental Coordinator (EC) or the local Defense Reutilization and Marketing Office (DRMO).
U.S. Army Sites	National Historic Preservation Act (Amended 1999) - 36 CFR 800, Section 106 Archaeological Resources Protection Act of 1979 (16 U.S.C. 470 aa-mm) -32 CFR 229	Act establishes a requirement and a process for ensuring the consideration in agency planning of historic (including archeological) properties that may be impacted by undertakings of the Federal government.	ARAR. Applicable since clearing, grubbing and/or excavation could impact nearby archeological sensitive areas (outside of disturbed area of Site 23).

TABLE 2-7
Action-Specific ARARs for Site 23

Action	Law/Regulation	Requirement of Law/Regulation	ARAR Status
Sampling and Analysis	Remediation Technical Requirements NJAC 7:26E-3	Requirements of quality assurance for sampling and analysis at remediation sites.	ARAR. Applicable to sampling and analytical activities at the site.
	Regulations Governing the Certification of Laboratories and Environmental Measurements NJAC 7:18:1-3, 5 and 9	Establishes the procedures for obtaining and maintaining certifications and the criteria and procedures that certified laboratories shall follow in handling, preserving, and analyzing regulatory samples.	ARAR. Applicable when selection a laboratory for sampling activities during removal action.
General Remediation	USEPA OSWER Publication 9345.3-03FS, January 1992	Investigation-derived wastes generated from remedial activities (e.g., drilling mud, purged water, etc.) are required to be properly stored, managed and disposed. Guidance given in the publication includes waste material containment, collection, labeling, etc.	Applicable for wastes generated during sampling

alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility and volume through treatment; short-term effectiveness; regulatory acceptance; and, community acceptance). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

The estimated present worth cost of the Selected Remedy is approximately $202,000. Although Alternative 1 would be less expensive, immediate risks to human health are not addressed; therefore, Alternative 5 is cost effective. The Army believes that the Selected Remedy's additional cost provides a significant increase in protection to human health and the environment and is cost effective.

2.12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

Based on the low levels of contaminants detected in groundwater, the selected remedy does not include treatment technologies. Over the long term, natural processes will reduce concentrations of contaminants in groundwater to levels below the chemical-specific ARARs.

2.12.5 Preference for Treatment as Principal Element

The selected remedy does not contain treatment as a principle element because no source materials constituting principle threats are present at Site 23. Over the long term, natural processes will decrease contaminant concentrations in groundwater to levels below the chemical-specific ARARs.

2.12.6 Five-Year Review Requirements

Five-year reviews will be conducted in compliance with CERCLA §121(c) and the NCP §300.430(f)(5)(iii).

2.13 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan presents the selected remedial action as the preferred alternative. The Army reviewed all written and verbal comments submitted on the Proposed Plan during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

SECTION 3.0

3.0 RESPONSIVENESS SUMMARY

The final component of the ROD is the Responsiveness Summary. The purpose of the Responsiveness Summary is to provide a summary of the stakeholders' comments, concerns, and questions about the Selected Remedy for Site 23 and the Army's responses to these concerns.

In general, the community is accepting of the Selected Remedy. The Army, USEPA, and NJDEP have considered all comments and concerns summarized below in selecting the final remedy for Site 23 at Picatinny.

3.1 PUBLIC ISSUES AND LEAD AGENCY RESPONSES

As of the date of this ROD, the Army endorses the preferred alternative for Site 23 as Groundwater Monitoring and Implementation of Land Use Restrictions. USEPA and NJDEP support the Army's plan. Comments received during the public comment period on the Proposed Plan (including the public meeting) are summarized below.

3.1.1 Summary of Comments Received during the Public Meeting on the Proposed Plan and Agency Responses

A public meeting was held on December 18, 2003, at which an explanation of the history of the site and remedial alternatives considered were presented. Specific comments raised during the public meeting are presented in this section.

Comment 1: Mr. Robert Cruthers, Denville representative to the Restoration Advisory Board (RAB), inquired if any contaminants had been detected in the surface water samples collected from the off-post spring.

Reply: Mr. Douglas Schicho, Project Manager for Shaw, responded that no contaminants had been detected in the surface water samples collected from the off-post spring.

Comment 2: Mr. Cruthers added that he had wanted to confirm the results of the surface water sampling because of concerns expressed by off-post residents, and thanked Mr. Schicho for his response.

Reply: Mr. Ted Gabel, Project Manager, Picatinny reported that he had received a phone call from Mr. Lou Smith, representative for Mountainview Manor and a former member of the RAB, stating that he wanted the public record to indicate that he was satisfied with the proposed remedy for Site 23.

Comment 3: Mr. Michael Glaab, the community co-chair of the PAERAB, asked Mr. Schicho to identify the areas within Site 23 where a previous removal action had been performed. Mr. Glaab inquired whether any of the alternatives included placement of a soil cap over Site 23, and why that alternative had not been selected.

Reply: Mr. Douglas Schicho described the areas where the previous removal action had been conducted and described the alternative that included the placement of a soil cap. He stated that placement of a new soil cap at Site 23 would not be justified given the additional cost and the small degree of additional protectiveness offered by constructing the new soil cap.

Comment 4: Mr. Glaab then pointed out that the alternative specifying a new soil cap had been recommended by NJDEP and inquired if a state representative was present to comment on this issue.

Reply: Mr. Gabel pointed out that NJDEP had accepted the feasibility study and the Proposed Plan for Site 23.

Comment 5: Mr. Glaab acknowledged that the Proposed Plan did state that according to NJDEP the proposed remedy for Site 23 was legally acceptable but pointed out that NJDEP had recommended alternative 2, which requires improvement of the existing soil cover. Mr. Glaab asked whether Mr. Gabel had anything further to say on the issue.

Reply: The NJDEP did recommend Alternative 2, improvement of the existing vegetated soil cover, but found the Army's preferred alternative, Alternative 5, acceptable.

3.1.2 Summary of Comments Received during the Public Comment Period and Agency Responses

Written comments were submitted by Subsurface Solutions LLC on behalf of the PAERAB and by the Law Offices of Schwartz, Tobia, Stanziale, Sedita,& Campisano on behalf of Pondview Estates.

Subsurface Solutions, Inc. on behalf of PAERAB

Comment 1: Integrity of Existing Soil Cover

Based on available information, the current cover has not undergone any maintenance such as would be required to repair the effects of erosion or revegetate (additional plantings) the soil surface. However, the area is reported to be well vegetated. Several members of the RAB attended a field trip to observe the area in the summer of 2002. These members concluded that the area appeared to be covered with healthy vegetation. Reports state that the vegetation consists of grass, shrubs, and trees. Such a vegetative cover would tend to stabilize the existing soil cover and minimize the amount of soil erosion. Provided that the vegetation remains healthy and intact, the soil cover should not be adversely impacted. The RAB requests that consideration be given to having the annual soil cover inspections include inspection of the flora by a qualified person (such as an ecologist specializing in plants) to assess the condition of the vegetation. Any adverse changes in the extent and/or health of the vegetation could then be addressed on an annual basis.

Response: The remedial design will require that the soil cover be inspected. Although healthy vegetation helps maintain the integrity of the soil cover, the condition of the vegetation itself is not of concern. Therefore, inspection of the vegetation by a plant specialist will only add to the cost of the selected remedy without providing any added benefits.

Comment 2: Enforcement of Land Use Controls

The preferred alternative relies on land use controls to ensure that the site remains undisturbed. Although such measures are in place at other locations on the base, there have been incidences where prohibited activities occurred despite supposedly protective measures. We would request that the disposal sites at the Post Farm Landfill be adequately posted so that there can be no confusion concerning the removal (or addition) of material (specifically soil and/or soil containing fly ash or other contaminants) from the area. Such posting would serve as an additional safeguard to inform the public and representatives affiliated with the base of the restrictions in the area.

Response: Site 23 is currently enclosed by perimeter fencing that includes warning signs. The remedial design will require that additional signage be placed at the perimeter of the entire site. Additionally, the remedial design will include a requirement that the signage be maintained.

Comment 3: Surface-Water Runoff and Proximity to Nearby Receptors

Alternative 5 also does not include any provision for redirecting surface water from running off base toward the Mountain View Manor complex and toward the stream that is a tributary to the Rockaway River. The stream is to be sampled as part of the monitoring program. In addition, a spring that emerges south of the site is also to be sampled as part of on-going monitoring. The RAB requests that consideration be given to analyzing the stream sample for turbidity as a means to evaluate whether increased sediment load has been added to the stream (such sediment loading having the potential to result from erosion at Site 23). In addition, stream flow conditions should also be documented at the time of surface-water sampling.

A main route of surface-water runoff is directly through the drum burial area where the majority of the fly ash is contained. Alternative 5 could be improved by including minor grading to correct surface water drainage.

Response: The stream mentioned in the comment is approximately 800 feet from either former burial area within Site 23 and is spring fed. The area between the former burial areas and the stream is heavily forested. Observation of Site 23 and the area between Site 23 and the stream after heavy rain events has exhibited no signs of secondary surface water drainage features leading directly to this stream. Based on these observations, direct sediment transport from Site 23 to the stream is thought to be extremely unlikely.

However, the current sampling protocol requires field analysis for turbidity. The long-term monitoring plan will require that turbidity analysis be continued. Additionally, visual observation of stream flow conditions will be conducted during surface water sampling. Due to the presence of mature vegetation and an intact soil cover, regrading of the drum burial area is not needed. The condition of the soil cover will be inspected during annual inspections, and if needed, regrading may be conducted in the future to protect the integrity of the soil cover.

Law Offices of Schwartz, Tobia, Stanziale, Sedita,& Campisano on behalf of Pondview Estates

Comment 1: Notwithstanding the somewhat misleading statement in the Fact Sheet for the Proposed Plan for Site 23 that area groundwater is not used for drinking water, the Army is well aware (and has been aware for some time), that since 2000 Pondview and Rockaway Township have a joint application pending with NJDEP for a Water Allocation Permit that would allow wells located less than a mile from the closest boundary of Picatinny to withdraw for potable use up to 1.3 million gallons per day of groundwater from the same aquifer as beneath the Site. Thus, the Army is certainly aware of the planned groundwater use "in the area." Furthermore, in August 2001, Pondview was issued a Water Use Registration by NJDEP that currently allows Pondview to use up to 100,000 gallons per day from its wells.

The Army's preferred Remedial Alternative for Site 23 is groundwater monitoring and implementation of land use controls. Pondview assumes that one of the primary land use controls which the Army will seek to implement includes the establishment of a Classification Exception Area (CEA) for groundwater in Area C. We are aware that in July 2002 the Army applied to the New Jersey Department of Environmental Protection (NJDEP) for a groundwater CEA coextensive with the boundaries of the entire Picatinny facility, which comprises nearly 6,200 acres.

The aquifer which underlies the Picatinny facility is a major source of drinking water for Morris County as well as outlying communities. Selection of the Army's preferred remedial action alternative, which disdains active groundwater remediation in favor of reliance upon monitored natural attenuation, would threaten to write off now and for many decades to come future potable use of groundwater located beneath the Site, preventing such use by generations of existing and future Morris County residents. Both the State and local governments in Morris County and other parts of Northern New Jersey are already grappling to address growing concerns about the potential future shortages in the potable water supply in the region. Given the recent drought conditions experienced in Northern New Jersey, this potential long-term loss of significant groundwater resources that could result under the Army's contemplated remedial action for Site 23 should not be deemed acceptable.

Response: The subject of the fact sheet is Site 23. The statement "groundwater in this area is not used for drinking water" when put in the context of the surrounding paragraphs is clearly referring to the groundwater at Site 23 not all of Area C or any off-post properties. The statement is correct; groundwater at Site 23 is not being used for drinking water and under the scope of this remedy will not be used for drinking water in the future.

As stated in the comment, the Army is aware of the pending application with the NJDEP. That application is not germane to this proposed plan. Because it has not been shown that Site 23 groundwater is within the capture zone of the pond view production wells, there is no technical basis for linking the Pondview estates water allocation permit and this remedial action.

The Army has applied for and been granted a classification exception area for the entire Picatinny property. The remedy proposed in this document is for one 10-acre site within a large facility. It does not "write off now and for many decades to come future probable use of groundwater located beneath the site." The remedies for other groundwater operable units within Picatinny have yet to be selected. However, it should be noted that the Army has begun the process for active groundwater remediation at many sites within Picatinny. The choice to pursue active remediation is being made in accordance with the CERCLA process. This process requires that cost reasonableness and technical implementablity be factors in remedy selection.

It would be inappropriate to use tax payers dollars to attempt active remediation at Site 23 where the majority of the "contaminants" are thought to be related to the naturally occurring geologic features.

Comment 1 continued: The Army's December 2003 Proposed Plan for Site 23 ("Proposed Plan"), states (at p. 8) in the section entitled "Human Health Risks Assessment," which summarizes the Site risks, that

"There are MCL exceedances of certain compounds in groundwater samples collected at the Post Farm Landfill (1 VOC, 1 dioxin/furan, 4 metals, and 3 radionuclides). MCL exceedances indicate the potential for human health risk if water, containing contaminants at levels greater than MCLs, is used for a potable water source. Long-term exposure through drinking, showering, etc. could result in excess human health risk."

Given the proposed Pondview potable wells' location and the planned groundwater use, the detection of several MCL exceedances and the potential risk they present to human health, cannot be lightly regarded. However, the health risk assessment for the Army's Proposed Plan appears to overlook these potential receptors and does not address such related concerns. These concerns ought to be seriously considered in assessing whether the Army's preferred Remedial Alternative is sufficiently protective of human health and satisfies the applicable regulatory requirements.

The Remedial Action Objectives for Site 23, which were required to be developed "to assure the protection of human health, ecological receptors and the environment" (Dec. 2003 Proposed Plan, p. 9) include the following:

- Prevent human exposure to groundwater contaminated with constituents of concern at levels greater than chemical-specific ARARs. . .and restore contaminated groundwater to beneficial use;
- Protect off-post groundwater. . .for unlimited use[.]

Pondview maintains that the Proposed Plan to merely monitor the groundwater (and restrict its use within the boundaries of the Site) will accomplish neither of the above state objectives. The Army's preferred Remedial Alternative will not bring about the restoration of contaminated groundwater beneath the Site for potable use in the foreseeable future, nor does it sufficiently provide for adequate protection to off-site groundwater for unlimited use by preventing potential off-site migration of contaminants in concentrations exceeding applicable groundwater standards. Instead, this proposed remedial action improvidently defers – until such time as contamination would potentially begin to migrate off-site – the necessary decision to undertake active remediation as a permanent remedy (which is preferred by ARARs) to address the contaminated groundwater at the Site in Area C. The Proposed Plan even admits that groundwater monitoring alone, without active measures, may not satisfy regulatory requirements: "(o)ver the long term, natural processes. . .will [only] likely reduce contamination concentrations [and] likely comply with ARARs." (See Proposed Plan, p. 17.) Given the high stakes involved, in terms of risks to human health and the environment, "likely" achieving these Remedial Action Objectives is simply not good enough and fails to fully comply with the legal requirements of CERCLA as well as the Army's obligations to the citizens of New Jersey.

Moreover, even the groundwater monitoring plan that the Army would implement as part of its preferred Remedial Alternative does not provide sufficient safeguards to address concerns regarding the potential off-site migration of contaminants. The proposed groundwater monitoring program would consist of only one sentinel well to monitor for lead and calls for only 1-2 years of quarterly monitoring to initially occur. Additional sentinel wells are necessary to ensure adequate early warning for all contaminants as well as proper characterization of any potential off-site migration of groundwater contamination that could threaten downgradient receptors. Quarterly monitoring should be required under any approved plan to continue until such time as the Army can clearly demonstrate from historic trends in groundwater quality data that conditions warrant reduced sampling frequency. In other words, the burden of proof should be placed on the Army to demonstrate that the potential risks have been sufficiently diminished to justify any reduction in periodic monitoring.

The groundwater is a natural resources which is held in public trust by the State for the people of New Jersey. The Army's proposed remediation plan could result in impermissibly and unjustifiably usurping from the current and future residents of Rockaway Township and surrounding Morris County localities the right to enjoy unrestricted use of this valuable natural resource. As the polluter responsible for the contamination, the Army must do the utmost to ultimately restore the condition of the groundwater to unrestricted use and, until then, take all necessary precautions to ensure with a sufficient degree of

certainty that contaminants do not further migrate to potentially threaten use of additional area groundwater. The Proposed Plan fails to satisfy these threshold requirements.

Response: The health risk assessment differentiates between receptors that have a reasonable chance of facing an impact and those that do not. A prerequisite for conducting a risk assessment is that there be at least one completed exposure pathway. In the case where there is no legitimate receptor, there is no need to generate a hypothetical one. The Site 23 administrative record documents a reasonable attempt to identify receptors and any exposures they might have. For groundwater at this site none were located.

The comment states that the selected alternative fails to meet the remedial action objectives as stated in the feasibility study. The comment is incorrect. Human receptors are protected through land-use restrictions and institutional controls. The groundwater at Site 23 has been monitored for a number of years. The one contaminant thought to be related to Picatinny activities is dichloroethene. Concentrations of this contaminant have been steadily decreasing. In fact during the last sampling round performed in late 2003 there were no ARAR exceedances of standards for DCE. Many of the remaining contaminants are thought to be related to geologic features rather than Army activity. Further, no movement or spread of the low-level detections of these contaminants has been seen. Therefore uncontaminated groundwater is not anticipated to be impacted in the future. Restoration of the groundwater at Site 23 will slowly take place through natural attenuation. It should be noted that some of the contaminants may not attenuate if they are in fact derived from the granitic gneiss underlying Site 23.

The comment in the second to last paragraph apparently refers to another site on Picatinny. The proposal for one sentinel well sampled for lead is unrelated to Site 23. Although the specifics of the long term monitoring for groundwater and surface water at Site 23 will not be determined until a plan is developed, the FS discussed sampling all of the wells at Site 23 for metals and radionuclides. In addition, wells previously impacted with DCE will be sampled for VOCs.

SECTION 4.0

4.0 REFERENCES

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